United States Department of the Interior

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In Reply Refer To:
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Memorandum

To: Regional Director, Fish and Wildlife Service, Albuquerque, New Mexico (ARD-ES) (Attn: Luela Roberts-Stroebel)

From: Field Supervisor

Subject: Intra-Service Biological and Conference Opinion on Issuance of an Enhancement of Survival Permit (TE-083686-0) to the Arizona Game and Fish Department

This memorandum represents our Biological and Conference Opinion (BO), pursuant to Section 7 of the Endangered Species Act of 1973 (Act) (16 U.S.C. 1531-1544), as amended. The Federal action under consideration is the issuance of a 50-year permit authorizing the incidental take of the endangered Gila topminnow (*Poeciliopsis o. occidentalis*), Yaqui topminnow (*P. o. sonoriensis*), desert pupfish (*Cyprinodon macularius*), and Quitobaquito pupfish (*C. m. eremus*) under the authority of sections 10(a)(1)(A) and 10(a)(2) of the Act within the Gila and Yaqui river basins in Arizona (Figure 1). The Arizona Game and Fish Department (Department) has submitted an application for an incidental take permit under the Act to take the federally listed endangered Gila and Yaqui topminnow and endangered desert and Quitobaquito pupfish (topminnow and pupfish, or plan species). Along with the application, the Department submitted a Safe Harbor Agreement (SHA) that we reviewed (AGFD 2007). The implementing regulations for section 10(a)(1)(A) of the Act, as provided for by 50 CFR 13 and 17, specify the criteria by which a permit allowing the incidental take of listed species following otherwise lawful activities may be obtained. The purpose and need for the section 10(a)(1)(A) permit is to ensure that incidental take resulting from the proposed management actions will lead to a net conservation benefit and will not appreciably reduce the likelihood of the survival and recovery of the species in the wild. This biological and conference opinion addresses the potential effects of implementing the proposed SHA on the four species above, and also on the endangered Yuma clapper rail (*Rallus longirostris yumanensis*), threatened Chiricahua leopard frog (*Rana chiricahuensis*), endangered Canelo Hills ladies'-tresses (*Spiranthes delitescens*), endangered Gila chub (*Gila intermedia*) with designated critical habitat, endangered razorback sucker (*Xyrauchen texanus*), the candidate Huachuca springsnail (*Pyrgulopsis thompsoni*), endangered Huachuca water umbel (*Lilaeopsis schaffneriana* ssp. *recurva*) with designated critical habitat, endangered Sonora tiger salamander (*Ambystoma tigrinum stebbinsi*), the endangered southwestern willow flycatcher (*Empidonax traillii extimus*) with designated critical habitat,

candidate yellow-billed cuckoo (*Coccyzus americanus*), and the candidate headwater chub (*Gila nigra*).

We determined that this action may affect, but is not likely to adversely affect the threatened loach minnow (*Tiaroga cobitis*) with designated critical habitat, endangered Yaqui chub (*Gila purpurea*) with designated critical habitat, threatened Yaqui catfish (*Ictalurus pricei*) with designated critical habitat, threatened beautiful shiner (*Cyprinella formosus*) with designated critical habitat, endangered Sonora chub (*Gila ditaenia*) with designated critical habitat, endangered jaguar (*Panthera onca*), and threatened spikedace (*Meda fulgida*) with designated critical habitat. Our rationales for these determinations on these species are in Appendix A. We further determined that this action will have no effect on the endangered Kearney bluestar (*Amsonia kearneyana*), threatened Mexican spotted owl (*Strix occidentalis lucida*) with designated critical habitat, endangered lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*), endangered bonytail chub (*Gila elegans*) with designated critical habitat, endangered brown pelican (*Pelecanus occidentalis californianus*), threatened Cochise pincushion cactus (*Corypantha robbinsorum*), Colorado pikeminnow (*Ptychocheilus lucius*), endangered ocelot (*Leopardus [Felis] pardalis*), endangered woundfin (*Plagopterus argentissimus*), endangered Nichol Turk's head cactus (*Echinocactus horizonthalonius* var. *nicholii*), endangered Mexican gray wolf (*Canis lupus*), candidate Acuna cactus (*Echinomastus erectrocentrus* var. *acunensis*), endangered Northern aplomado falcon (*Falco femoralis septentrionalis*), candidate Stephan's riffle beetle (*Heterelmis stephani*), endangered Pima pineapple cactus (*Coryphantha robustispina* ssp. *scheeri*), endangered Sonoran pronghorn (*Antilocapra americana sonoriensis*), threatened New Mexican ridge-nosed rattlesnake (*Crotalus willardi obscurus*) with designated critical habitat, endangered masked bobwhite (*Colinus virginianus ridgewayi*), endangered Arizona hedgehog cactus (*Echinocereus triglochidiatus* var. *arizonicus*), endangered Arizona cliffrose (*Purshia subintegra*), candidate Lemmon fleabane (*Erigeron lemmonii*), and endangered Mount Graham red squirrel (*Tamiasciurus hudsonicus grahamensis*) with designated critical habitat (Appendix B). Our rationales for these determinations are in Appendix B.

This biological opinion is based on information provided in the December 3, 2007 Safe Harbor Agreement, environmental assessment (EA)(USFWS 2008), telephone conversations, field investigations, Fish and Wildlife Service (Service) files, and other sources of information. References cited in this biological opinion are not a complete bibliography of all references available on the species of concern, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file in the Arizona Ecological Services Office.

Consultation history

- February 10, 2004: We received the SHA and an application for an Enhancement of Survival permit from the AGFD.

- March 25, 2004: We published a Notice of Availability of the permit application and draft Agreement and EA in the Federal Register (USFWS 2004).

- April 26, 2004: The 30-day public review period closed.

- July 21, 2004: We sent a draft BO, EA, and Findings document to the Department for their review.

- January 26, 2006: The Department Director approved finalizing the Safe Harbor Agreement.

- August 1, 2007: We sent a draft BO, EA, Findings document, and permit stipulations to the Department for their review.

- December 21, 2007: We received the signed SHA and comments on the BO.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

The proposed action is our issuance of an Enhancement of Survival permit to the Department for the reestablishment of endangered Gila and Yaqui topminnow and endangered desert and Quitobaquito pupfish. The purpose of the proposed action is to authorize incidental take, including possible habitat modification on lands controlled by the Department and landowners enrolled in the SHA (Cooperators). A complete description of the proposed action and the mitigation measures is included in the SHA (AGFD 2007).

The Department is requesting a permit to stock topminnow and pupfish on non-Federal properties within the historical ranges of these species in the Gila and Yaqui river basins in Arizona. The Department requests permission to stock topminnow and pupfish to aid in recovery of these fishes and for the following reasons:

- To provide additional suitable aquatic habitats that have been largely unavailable for reestablishment of topminnow and pupfish populations;

- To increase public awareness of conservation needs for native fishes;

- To use native fish for mosquito control while reducing or eliminating the use of nonnative mosquitofish (*Gambusia affinis*); and

- To develop new partnerships between Federal, state, and non-Federal landowners.

This SHA covers habitats occurring on non-Federal land within the historical ranges of topminnow and pupfish in Arizona including, but not limited to:

- Retention basins;
- Water treatment facilities;
- Groundwater recharge basins;
- Natural or artificial wetlands;
- Springs, marshes, or streams;
- Residential waters;
- Natural or artificial ponds, lakes, or other catchments; and
- Golf course ponds or other artificial water features.

If fish have the potential to naturally spread to adjacent landowners' properties, the sites may not be used, unless potentially affected adjacent landowners have been given the opportunity to voluntarily participate by signing a Certificate of Inclusion. The potential for fish to spread will be determined using the following criteria:

- The water to be stocked is not hydrologically connected to other waters; or
- If the water to be stocked was to be breached by flooding, any fish being moved or moving from the site would not reach suitable habitat.

In certain cases, coordination and compliance with Federal land management agencies may also be necessary if fish have the potential to naturally disperse from habitats covered under this SHA onto Federal lands. Additional section 7 consultation may be needed for Federal lands. Landowners will sign a Certificate of Inclusion to be covered by the permit. Landowners enrolled in the SHA are known as Cooperators. The SHA identifies the responsibilities of the Department, Service, and Cooperators.

The landowners who participate in this SHA may include, but are not limited to:

- Private citizens;
- Non-governmental organizations;
- State, county, and local vector control agencies;
- State, city, or county land and water management divisions;

- State, county, and municipal parks;
- Private corporations; and
- The Arizona Game and Fish Commission (as signatory to the SHA, the Department will enroll aquatic sites on Wildlife Areas or other Arizona Game and Fish Commission properties on a case-by-case basis under separate Certificates of Inclusion).

Under the SHA, the Service agrees to:

- Provide technical assistance and provide information on Federal funding programs;
- Issue an enhancement of survival permit to the Department under section 10(a)(1)(A) of the Act, authorizing take of the covered species as a result of lawful activities within the enrolled properties. The term of the permit will be 50 years. After this time, the permit may be renewed if agreed upon by all parties;
- Provide topminnow and pupfish (or coordinate for appropriate genetic stock to be provided via another agent, such as the Department);
- Ensure the Department is implementing the terms of the SHA; and
- Assist the Department with compliance monitoring and biological monitoring, as necessary, contingent on the availability of funds.

Under the SHA, the Department agrees to:

- Coordinate with non-Federal landowners to determine site suitability;
- Provide technical advice and assistance with obtaining necessary state permits;
- Coordinate with the Service to determine appropriate genetic lineage to be stocked at each property, and conduct the stocking or augmentation of topminnow or pupfish;
- Coordinate with Cooperators and the Service to determine a schedule for monitoring and reporting on compliance;
- Conduct compliance monitoring on Cooperators' properties as identified, contingent on the availability of funds;
- Conduct biological monitoring as necessary, or as funds remain available to the Department to conduct monitoring of topminnow and pupfish populations; and

- Notify the Service before any planned action that will result in loss of a population. The Department will notify the Service within five days of receipt of notice from a Cooperator of any such planned action.

Under the SHA, the Cooperators (non-Federal landowners) must agree to:

- Guarantee ownership of the land and warrant that there are no outstanding rights which interfere with the SHA and to notify the Department of planned or pending ownership changes at least 60 days in advance;

- Notify the Department 30 days in advance of any planned management activity that may result in the loss of the population and provide the Department the opportunity to capture and relocate individuals;

- Allow the Department or its authorized representative access to the project site, upon reasonable notification by the Department, for agreed-upon wildlife habitat development and management purposes, to inspect work completed, to perform biological monitoring, and to augment the population if necessary, pursuant to Section 3 of the Certificate of Inclusion. All Department employees will be in uniform and all Department representatives will have proper identification as government employees, agents, or assignees.

- Allow the Service (its members, agents, or assignees) access to the project site, upon reasonable notification by the Service, to perform compliance monitoring, as necessary. At least one Service representative will be in uniform, and all will have proper identification as government employees, agents, or assignees.

- Where applicable and agreed to by the Cooperator, provide access for public education and information related to endangered species recovery, conservation of limited resources, and native aquatic ecology;

- Prevent or otherwise minimize and control the introduction of nonnative competitors or potential disease vectors into native fish habitat via the following measures: (i) commitments by Cooperators to not knowingly engage in releases of frogs, fish, crayfish, salamanders, turtles, or any other wildlife into native fish habitats on participating properties; (ii) commitments by Cooperators to report to the Department any observed occurrences of such species in native fish habitat on participating properties; (iii) commitments by Cooperators to permit access to their land by appropriate personnel necessary to implement control programs for these species (subject to reasonable advance notice); and (iv) where appropriate, and subject to their concurrence, agreement by Cooperators to conduct control measures when requested by the Department. Any such measures must be compatible with needed activities by the Cooperator;

- Agree to not transport any topminnow or pupfish from the stocked location to any other location;

- Assume responsibility for securing any other permits or authorizations as needed to carry out the SHA; and

- Coordinate with the Department to conduct required monitoring and reporting.

Although the SHA allows landowners to conduct any activity they choose other than release nonnative species, the following activities are those we have identified, for purposes of this consultation, as those most likely to result in take:

1. Contamination of water due to run-off from roadways, agricultural fields, etc.;

2. Contamination of water during pesticide application;

3. Intentional drying of the habitat;

4. Earthwork around occupied habitats;

5. Management actions to remove nonnative aquatic species;

6. Vegetation management;

7. Water diversion and management;

8. Monitoring of topminnow and pupfish populations as agreed upon in section 9 of the SHA (permitted separately under a Scientific Collection Permit); and

9. Any normal day-to-day land use and management activity as agreed to by the Department and the Cooperator.

In addition to the activities listed above (Items 1-9), extenuating factors beyond the landowners' control could result in loss of topminnow and pupfish. Examples of extenuating factors include, but are not limited to:

10. Invasion and predation by species such as nonnative fishes, bullfrogs (*Rana catesbeiana)*, crayfish, and others;

11. Predation by native or nonnative wildlife such as birds, mammals, reptiles, and amphibians;

12. Complete desiccation caused by drought or other actions outside the landowners' control;

13. Extreme water quality fluctuations resulting from natural causes or outside sources;

14. Elimination of the population due to flooding;

15. Other natural events including fire and drought; and

16. Immediate responses to emergencies including, but not limited to, fires, contamination, desiccation, flooding, or vector control.

Each potential property will be surveyed by the Department or other qualified individuals to determine baseline conditions before the Department will issue a Certificate of Inclusion. Baseline conditions will be determined and agreed to in writing by the Department and Cooperator and concurred with by the Service. Baseline conditions may include habitat characteristics or species presence.

Cooperators may agree to an elevated baseline condition when appropriate and agreed upon. Committing to an elevated baseline in a Certificate of Inclusion is entirely voluntary for a Cooperator. The Department, with Service concurrence, must determine if an elevated baseline at any particular site supports the goals of the SHA and furthers the recovery of the species. Properties where an elevated baseline might be most appropriate are those that have natural or semi-natural aquatic habitats and where property development is not expected to occur in the foreseeable future. By agreeing to this elevated baseline, the population will still exist when taken back to baseline conditions (with a baseline of zero, the population is eliminated when taken back to baseline conditions). Property owners must maintain the elevated baseline through the term of their agreement.

The SHA and the Enhancement of Survival permit would be in effect for 50 years. At the end of the permit term, properties covered under this SHA may be taken back to baseline conditions before the permit expires to avoid accruing additional take liability under the Act. However, the permit and SHA may be extended beyond the specified terms through amendment, upon agreement by all parties.

Each Certificate of Inclusion issued by the Department to a Cooperator will specify how long the conservation measures will be maintained and when they will be implemented. This is termed the required conservation period and will be agreed to by the Department and Cooperator.

A minimum commitment of 10 years is required under this SHA, but longer periods are allowable and are encouraged. The conservation period agreed to within individual Certificates of Inclusion will depend on several circumstances including whether or not the landowner has any future land use plans, whether or not conservation measures under the SHA have included a material benefit to the landowner, and the landowner's comfort level. The specific conservation period agreed to must be specified within the Landowner's Certificate of Inclusion. In certain situations, a 10-year commitment may not be practicable, and shorter commitments will be

granted on a case-by-case basis. Such instances would include artificial habitats that are anticipated to be relatively temporary and require ongoing management to maintain.

Additionally, Cooperators may terminate their Certificate of Inclusion at any time and for any reason, on written notification to the Department. Once such notification is received and desired salvage operations are conducted, a cooperator may take the population back to baseline condition. Such termination shall extinguish the Cooperator's authority to incidentally take topminnows or pupfish under the Enhancement of Survival Permit.

Monitoring of incidental take, species populations, and habitats is an integral part of the SHA. Monitoring is shared among the various partners, but the ultimate responsibility for monitoring lies with the Department as the Permittee. The SHA provides for two types of monitoring as required by Service policy (64 FR 32717) and Federal regulation (64 FR 32706): (1) compliance monitoring to ensure that all commitments are being met, and (2) biological monitoring to ensure that the biological goals are being met and to determine the effectiveness of the conservation program.

Compliance Monitoring

There are two types of compliance monitoring. One will determine if cooperators are complying with their Certificate of Inclusion and the other will determine if the Department is complying with the Enhancement of Survival Permit. The Department or an authorized representative of the Department will ascertain compliance by each cooperator as necessary. Specific requirements of compliance monitoring are a maximum of four visits per year (and a minimum of one visit per two years) to each site subject to this SHA to verify that all required conservation commitments are being properly implemented. Before any visit, Department monitoring personnel or representatives shall give notice to the Cooperator of not less than 14 days before the visit and shall arrange the visit so it is compatible with the landowner's schedule and needs. This monitoring requirement shall commence from the effective date of the Certificate of Inclusion for each affected Cooperator. In addition, the Service is responsible for monitoring the Department's compliance with the 10(a)(1)(A) Permit. This can include audits of relevant Department files biennially.

Biological Monitoring

The Department and the Cooperator are jointly responsible for coordinating efforts to insure that annual monitoring and reporting related to implementation of the SHA and fulfillment of its provisions are arranged. The biological monitoring will address the status and distribution of established topminnow and pupfish populations. The biological monitoring may also address issues that require adjustment to the SHA's conservation program through Adaptive Management provisions in the SHA. Specific biological monitoring requirements are as follows:

1. For any aquatic site on participating lands to which topminnow or pupfish have been stocked: one monitoring visit conducted one month after the stocking, one visit six months after the stocking, and one visit one year after stocking. The monitoring schedule shall remain in effect unless the Department and the Cooperator determine that another schedule is appropriate, such as for smaller sites (<1600 ft^2). Monitoring must be done at least once every two years.

2. Information to be collected during site visits described in paragraph (1) above shall consist of the following:

    a. Type of site (stream, pond, wetland, etc.);

    b. General description of the site and its condition, including water quality (water temperature, pH, conductivity, dissolved oxygen);

    c. Presence or absence, and distribution of topminnow and pupfish and at least approximate numbers of adults and juveniles;

    d. Presence or absence, and distribution of nonnative aquatic species;

    e. Color photos (35mm slides or digital photos) of the habitat taken at fixed points;

    f. Land management activities that may result in take, if any;

    g. A general threat assessment and recommendations for how to alleviate the threats; and,

    h. Any other pertinent information.

Responsibility for Monitoring

Compliance monitoring for the permit will be funded and carried out by the Service or any authorized representative of the Service. Biological monitoring and Cooperator compliance monitoring under the permit will be funded and carried out primarily through the Department, and may include the Cooperator, other agencies, academic institutions, conservation organizations, or other entities. The primary obligations of Cooperators with respect to biological monitoring will be to grant access to their properties by personnel conducting the monitoring, subject to reasonable advance notification. In addition, persons that conduct the biological monitoring must be able to distinguish between topminnow and mosquitofish.

Annual Reporting

Each Cooperator will submit an annual report to the Department by January 31 that describes activities under the SHA for the preceding year. If the Cooperator does not conduct biological monitoring, it is the responsibility of the entity that conducted the monitoring to submit the annual report to the Department. Required information for the Cooperator's report is found in the SHA.

The Department will submit one copy of a cumulative report describing biological and compliance monitoring activities under the SHA for the preceding year to both the Service's Arizona Ecological Services Office and Albuquerque Regional Office. The Department's annual report will be due by March 15 of each year throughout the term of the permit. If the first year of the SHA is six months or less, the report will be completed the following year. Information required in the Department's annual report is as follows:

- A summary of the cumulative total of Cooperators enrolled in the SHA at the time of preparation of the report;
- The cumulative total of topminnow and pupfish populations being managed under the SHA;
- The status of each population and their associated habitats within the covered area at the time of the report with respect to the SHA's biological goals;
- Any Cooperators that enrolled under the SHA in the preceding year, including copies of their Certificates of Inclusion;
- Any topminnow and pupfish management activities that were implemented in the preceding year, including population establishment, augmentation, or habitat improvement projects, and original source of topminnow and pupfish stocked;
- Funding sources that were used in the preceding year, funding uses for that year, and funding sources expected to be obtained in the following year;
- Any incidental take of topminnow and pupfish known or suspected to have occurred within the covered area in the preceding year and an explanation of the reasons for the take;
- Results of biological monitoring activities conducted in the preceding year, with supplemental information on biological or habitat-related problems that need to be addressed; and
- Any other pertinent information regarding the status of the SHA's conservation program or implementation of the program.

Conservation Measures

Management actions such as major earthwork, removal of nonnative aquatic species, pesticide application, and other management activities expected to result in take will be scheduled in advance, and at least 30 days notice before the activities will be provided to the Department. This will allow the Department the opportunity to relocate fish temporarily if deemed necessary by the Department in consultation with the Service. If activities require long-term removal of fish, arrangements can be made to house them at alternative locations.

If mosquitofish occur in any habitat covered under this SHA, removal efforts should be completed before topminnow or pupfish are released. If other nonnative aquatic species occur at potential sites, utilization of those habitats will be decided on a site-specific basis. It is possible that other native fish or frogs could already exist at an enrolled site, or be released there later.

Any loss of the populations due to such disturbances may require supplemental stockings of topminnow or pupfish. The Department will consult with the Service and/or criteria in the species' recovery plans to determine the appropriate source population for initial and supplemental stockings.

STATUS OF THE SPECIES

Gila topminnow

The Sonoran topminnow (*Poeciliopsis occidentalis*) was listed as endangered in 1967 under endangered species legislation enacted in 1966 (Public Law 89-669)(32 FR 4001). The species was later revised to include two subspecies, *P. o. occidentalis* and *P. o. sonoriensis* (Minckley 1969, 1973). *P. o. occidentalis* is known as the Gila topminnow, and *P. o. sonoriensis* is known as the Yaqui topminnow. *Poeciliopsis occidentalis*, including both subspecies, is collectively known as the Sonoran topminnow. Both subspecies are protected under the Act. Minckley (1999) believes that the Yaqui topminnow and Gila topminnow are separate species being named *P. sonoriensis* and *P. occidentalis*, respectively.

Only Gila topminnow populations in the United States, and not in Mexico, are listed under the Act. The reasons for decline of this fish include past dewatering of rivers, springs and marshlands, impoundment, channelization, diversion, regulation of flow, land management practices that promote erosion and arroyo formation, and the introduction of predacious and competing nonnative fishes (Miller 1961, Minckley 1985, Desert Fishes Team 2003). Other listed fish suffer from the same impacts (Moyle and Williams 1990). Life history information can be found in the 1984 recovery plan (USFWS 1984), the Draft Revised Gila topminnow Recovery Plan (Weedman 1998), and references cited in the plans.

Gila topminnow are highly vulnerable to adverse effects from nonnative aquatic species (Johnson and Hubbs 1989). Predation and competition from nonnative fishes have been a major factor in

their decline and continue to be a major threat to the remaining populations (Meffe et al. 1983, Meffe 1985, Brooks 1986, Marsh and Minckley 1990, Stefferud and Stefferud 1994, Weedman and Young 1997). The native fish fauna of the Gila basin and of the Colorado basin overall, was naturally depauperate and contained few fish that were predatory on or competitive with Gila topminnow (Carlson and Muth 1989). Thus, Gila topminnow did not evolve mechanisms for protection against predation or competition and are predator- and competitor-naive. With the introduction of many predatory and competitive nonnative fish, frogs, crayfish (*Procambarus clarki*), and other species, Gila topminnow could no longer survive in many of their former habitats, or the small pieces of those habitats that had not been lost to human alteration. Both large (Bestgen and Propst 1989) and small (Meffe et al. 1983) nonnative fish cause problems for Gila topminnow as can nonnative crayfish (Fernandez and Rosen 1996) and bullfrogs.

Historically, the Gila topminnow was abundant in the Gila River drainage and was one of the most common fishes of the Colorado River basin, particularly in the Santa Cruz system (Hubbs and Miller 1941). The range of Gila topminnow was reduced to only 15 naturally occurring populations. Presently, only 9 of the 16 recent natural Gila topminnow populations are considered extant (Table 1)(Voeltz and Bettaso 2003). Only three populations (Cienega Creek, Monkey Spring, Cottonwood Spring) have no nonnative fish present and therefore can be considered secure from nonnative fish threats. There have been at least 175 wild sites stocked with Gila topminnow; however, topminnow persists at only 21 of these localities. Of the 21, one site is outside topminnow historical range and four now contain nonnative fish (Weedman and Young 1997). The entire range of the species in Arizona is covered by the SHA.

Historically, populations of Gila topminnow expanded in size and geographic range during wetter periods (when habitats were connected). These populations subsequently contracted and often disappeared during times of drought (Minckley 1999, Weedman 1998). Due to high reproductive potential and an adaptation to environmental extremes, numbers of individuals of both species will likely fluctuate over time after being introduced into the aquatic habitats under the SHA.

The status of the species is poor and declining. Gila topminnow has gone from being one of the most common fishes of the Gila basin to one that exists at not more than 30 localities (12 natural and 18 stocked). Many existing localities are small and highly threatened.

Although many recovery actions have occurred for this species, Federal actions have contributed to the degraded environmental baseline of the Gila topminnow. Federal actions requiring section 7 consultations affecting the National Forests, Bureau of Land Management public lands, and others in the Gila River basin have contributed to the lowered baseline. An indication of the poor environmental baseline of the Gila topminnow is that two previous formal consultations have resulted in jeopardy opinions. Other Federal actions and non-Federal actions that have not undergone section 7 consultation, also have unmitigated adverse effects that contribute to the degraded baseline.

Table 1. Status of natural Gila topminnow populations in the US.

Site	Ownership	Extant?[1]	Nonnatives?	Mosquitofish?	Habitat Size[2]	Threats[3]
Bylas Spring[5]	San Carlos	YES	NO[4]	NO[4]	S D	M/ N G
Cienega Creek	BLM	YES	NO	NO	L	M/ R N
Cocio Wash	BLM	NO 1982	UNKNOWN	UNKNOWN	S	site no longer exists
Cottonwood Spring	Private	YES	NO	NO	S	M/ N G W
Fresno Canyon	State Parks	YES	YES	NO[4]	M	H/ G
Middle Spring[5]	San Carlos	YES	NO[4]	NO[4]	S	H/ N G
Monkey Spring	Private	YES	NO	NO	S	L/ W U
Redrock Canyon	USFS	NO 2005	YES	YES	M D	H/ W R G N
Sabino Canyon	USFS	NO 1943	YES	NO	M	H/ R N
Salt Creek[5]	San Carlos	YES	NO[4]	NO[4]	S	M/ N G
San Pedro River	Private	NO 1976	YES	YES	-	H/ W N G R
Santa Cruz River San Rafael Tumacacori Tucson	Private, State Parks, TNC	 YES[6] YES NO 1943	 YES YES[4] YES	 YES YES NO	L D	H/ W N R G C U
Sharp Spring	State Parks	NO 2004	YES	YES	M	H/ N G
Sheehy Spring	TNC	NO 1987	YES	YES	S	H/ N G
Sonoita Creek	Private, TNC, State Parks	YES	YES	YES	L D	H/ W N G
Tonto Creek	Private, USFS	NO 1941	YES	YES	L	H/ N R G W

[1] if no, last year recorded
[2] L = large M= medium S = small D = disjunct
[3] Immediacy H = high M = moderate L = low
Type W = water withdrawal C = contaminants R = recreation N = nonnatives G = grazing M = mining U = urbanization
[4] none recently, they have been recorded
[5] recently renovated
[6] in Mexico 2006, US in 1993

Yaqui topminnow

The Sonoran topminnow (*Poeciliopsis occidentalis*) was listed as endangered in 1967 under endangered species legislation enacted in 1966 (Public Law 89-669)(32 FR 4001). The species was later revised to include two subspecies, *P. o. occidentalis* and *P. o. sonoriensis* (Minckley 1969, 1973). *P. o. occidentalis* is known as the Gila topminnow, and *P. o. sonoriensis* is known as the Yaqui topminnow. Both subspecies are protected under the Act. Minckley (1999) believes that the Yaqui topminnow and Gila topminnow are separate species being named *P.*

sonoriensis and *P. occidentalis*, respectively. Critical habitat has not been designated for this species.

The Yaqui topminnow (*P. o. sonoriensis*) is a small, livebearing fish of the family Poeciliidae (Minckley 1973). It is found throughout the Río Yaqui and adjacent drainages in Arizona and Sonora, México (Hendrickson et al. 1980, Juarez-Romero et al. 1988, Campoy-Favela et al. 1989), but is listed only in the United States' portion of its range. Its historical range in the United States encompassed the lower to mid-elevation reaches of the Río Yaqui basin, including Whitewater and Black draws. Much of the habitat in those areas has been lost to water diversion, stream downcutting, backwater draining, vegetation clearing, channelization, grazing, groundwater pumping, and other human uses of the natural resources (49 FR 34490). In addition, nonnative fish have been introduced in many portions of its historical range in the United States. The mosquitofish is particularly damaging and was first found in the United States portion of the Río Yaqui basin in 1979 (Hendrickson et al. 1980, Meffe et al. 1983, Galat and Robertson 1992). The entire range of the Yaqui topminnow in Arizona is covered by the SHA.

In the United States, Yaqui topminnow are presently found only on the San Bernardino National Wildlife Refuge. Additional information can be found in the Rio Yaqui Fishes Recovery Plan (USFWS 1995).

Desert pupfish

The desert pupfish was listed as an endangered species with critical habitat in 1986 (51 FR 10842). Historical distribution of desert pupfish in Arizona included the Gila, San Pedro, Salt, and Santa Cruz rivers, and likely the Hassayampa, Verde, and Aqua Fria rivers, although collections are lacking for the latter three. The desert pupfish is also found in the Lower Colorado River, Rio Sonoyta basin, Salton Sink basin, and Laguna Salada basin (Eigenmann and Eigenmann 1888, Garman 1895, Gilbert and Scofield 1898, Evermann 1916, Miller 1943, Minckley 1980, Black 1980, Turner 1983, Miller and Fuiman 1987). Historical collections occurred in Baja California and Sonora, Mexico and in the United States in California and Arizona.

The desert pupfish is in the family Cyprinodontidae. In Arizona, this family was historically represented by two recognized subspecies, (*Cyprinodon m. macularius)* and (*C. m. eremus)*, and an undescribed species, the Monkey Spring pupfish. Minckley et al. (2002) raised *C. m. eremus* to a species, *C. eremus*. Also, Minckley et al. (2002) suggested that the Santa Cruz River drainage was historically occupied by the extinct Santa Cruz (=Monkey Spring) pupfish, described as *Cyprinodon arcuatus*. This has led to discussion among experts as to whether desert pupfish (*C. macularius*) should be reestablished in the Santa Cruz drainage, since it has been proposed that *C. arcuatus* was the species of pupfish historically found in the Santa Cruz drainage (Minckley et al. 2002). There is general agreement that available suitable habitats in the Santa Cruz drainage should be used for desert pupfish (*C. macularius*) recovery purposes. Both species of pupfish (*C. arcuatus* and *C. macularius*) were extremely similar to each other, and likely ecologically equivalent. Minckley et al. (2002) suggest that the species are similar enough

that they were long confounded under *C. macularius,* and the biogeographic considerations suggest that the affinities of *C. arcuatus* lie with *C. macularius* or *C. eremus*. Regardless of the ultimate origins of *C. macularius* and *C. arcuatus*, the Santa Cruz drainage is historical habitat for the genus *Cyprinodon*, and potential recovery habitats in the Santa Cruz should be pursued for *C. macularius*. The Quitobaquito pupfish (*C. eremus*) occurs in Quitobaquito Spring in the Rio Sonoyta drainage.

The natural history of the desert pupfish is very similar to that described for the Gila topminnow. They occupied similar habitats, although the pupfish was not nearly as widespread. The desert pupfish also went through cycles of expansion and contraction of populations because of natural climatological variation (Weedman and Young 1997). Such a scenario would have led to panmixia among populations over a very large geographic area (USFWS 1993).

Thirteen natural populations persist; nine of these are in Mexico. Approximately 20 transplanted populations exist in the wild (USFWS 1993). One or more threats imperil most natural and transplanted populations. Since the 19th century, desert pupfish habitat has been destroyed by stream bank erosion, the construction of water impoundments that dewatered downstream habitat, excessive groundwater pumping, the application of pesticides to nearby agricultural areas, and the introduction of nonnative fish species. Nonnative bullfrogs may also prove problematic in the management of desert pupfish. The bullfrog is an opportunistic omnivore with a diet throughout its range that includes fish (Cohen and Howard 1958, Clarkson and deVos 1986). There is also a concern that introduced salt cedar (*Tamarix* spp.) next to pupfish habitat may cause a lack of water at critical times (Bolster 1990; R. Bransfield, USFWS, pers. comm., 1999). The remaining populations continue to face these threats, and the Salton Sea area populations, in particular, are severely threatened. The entire range of desert pupfish in Arizona is covered by the SHA.

Naturally occurring populations of desert pupfish are now restricted in California to two streams tributary to, and a few shoreline pools and irrigation drains of, the Salton Sea. The species is found in Mexico at scattered localities along the Rio Sonoyta, on the Colorado River Delta, and in the Laguna Salada basin. The Mexican government has also listed the species as endangered. Additional life history information can be found in the recovery plan (USFWS 1993) and other references cited there.

Quitobaquito pupfish

The desert pupfish and Quitobaquito pupfish were listed as endangered species with critical habitat in 1986, (51 FR 10842). Critical habitat was designated in Arizona at Quitobaquito Springs in Pima County and in California along parts of San Felipe Creek, Carrizo Wash, and Fish Creek Wash. The Mexican government has also listed the species as endangered. In Arizona, the genus *Cyprinodon* was historically comprised of two recognized subspecies, (*C. m. macularius)* and (*C. m. eremus)*, and an undescribed species, the Monkey Spring pupfish. The desert pupfish subspecies are now recognized as separate species, the desert pupfish (*Cyprinodon macularius*) and the Quitobaquito pupfish (*C. eremus*)(Echelle et al. 2000), and the undescribed

form has since been described and renamed the Santa Cruz pupfish (*C. arcuatus*)(Minckley et al. 2002).

Although the Quitobaquito pupfish has only recently been described as a species distinct from its sister species, the desert pupfish, it has long been recognized as a distinct form (Miller 1943, Hubbs and Miller 1948, Minckley 1973, Miller and Fuiman 1987). The species is endemic to Quitobaquito springs and pond, Organ Pipe Cactus National Monument, Pima County, Arizona, and the nearby Rio Sonoyta, in northern Sonora, Mexico (Echelle et al. 2000). Their general morphology and ecology is similar to the desert pupfish.

The historical distribution of Quitobaquito pupfish was similar to its current distribution, with the exception that it no doubt occurred in a much longer reach of the Rio Sonoyta. The entire range of the species in Arizona is covered by the SHA. Surface water impoundments and diversions and groundwater withdrawal for increasing agricultural and municipal water use throughout the last century altered the flow regime, eroded stream banks of the Rio Sonoyta, and lowered water tables, which undoubtedly dried it considerably and greatly reduced its habitat. As a result, today the Quitobaquito pupfish occurs only in about a 1 to 2 km (0.6-1.2 mi) reach of the Rio Sonoyta about 20 km (12 mi) west of the town of Sonoyta, and in Quitobaquito pond and spring channel at Organ Pipe Cactus National Monument. The subsurface aquifer of Aguajita Wash provides water for more than five springs and seeps in the Quitobaquito area, from Aguajita Springs on the southeast to Williams Spring more than 2.5 km (1.5 mi) to the northwest. All these springs and the Aguajita aquifer are hydrologically linked. The Quitobaquito pond is lined with plastic, but has dense riparian vegetation surrounding it.

Additionally, the Quitobaquito pupfish has been affected by the application of pesticides in agricultural areas of the Rio Sonoyta valley, and the introduction of the nonnative fish species, black bullhead (*Ictalurus melas*) and mosquitofish (McMahon and Miller 1985, Hendrickson and Varela 1989). There is also a concern that introduced salt cedar next to pupfish habitat may cause a lack of water at critical times (Bolster 1990; R. Bransfield, USFWS, pers. comm., 1999). Evapotranspiration by luxuriant growths of this plant may especially impact smaller habitats where water supply is limited. The remaining populations continue to face these threats, primarily due to increasing groundwater withdrawal and the potential introduction of non native predators.

About five transplanted refuge populations of Quitobaquito pupfish exist, although none of these are wild or self-sustaining (USFWS files). The future of the species depends heavily upon future developments in water management of the Rio Sonoyta valley in Mexico. Additional life history information can be found in the recovery plan (USFWS 1993) and other references cited there.

Yuma clapper rail

The Yuma clapper rail was listed as an endangered species in 1967, under endangered species legislation enacted in 1966 (Public Law 89-669). Only populations found in the United States were listed as endangered; those in Mexico were not listed under the 1966 law or the subsequent

Endangered Species Act of 1973 (as amended). Critical habitat has not been designated for the Yuma clapper rail. The Yuma Clapper Rail Recovery Plan was issued in 1983 (USFWS 1983).

Habitat for the Yuma clapper rail is freshwater and brackish marshes with dense vegetation, dominated by cattails that includes both mats of old material and more open stands. The most productive areas consist of uneven-aged stands of cattails interspersed with open water of variable depths (Conway et al. 1993). Other important factors in the suitability of habitat include the presence of vegetated edges between marshes and shrubby riparian vegetation (salt cedar or willow thickets) (Eddleman 1989) and the amount and rate of water level fluctuations within the habitat. Water flow in the open channels within the marsh is desirable (Todd 1971, Tomlinson and Todd 1973). Yuma clapper rails will use quiet backwater ponds, flowing stream or riverside areas, irrigation canals and drainage ditches, reservoirs and small lakes, or other small marshlands where cattail habitat is available. Natural and artificially constructed marshes can provide suitable habitat.

The breeding season for the Yuma clapper rail runs from March though early July (Todd 1986, USFWS 1983). The start of the survey season, March 15, is used as the official beginning of the breeding season. Nests are constructed in marsh vegetation or low growing riparian plants at waters edge. Nonnative crayfish form the primary prey base for Yuma clapper rails (Todd 1986). Before the introduction of crayfish, isopods, aquatic and terrestrial insects, clams, plant seeds, and small fish likely dominated the diet. Once believed to be highly migratory (with most birds thought to winter in Mexico), telemetry data showed most rails do not migrate (Eddleman 1989). Additional life history information is found in the Recovery Plan (USFWS 1983), Todd (1986), Eddleman (1989), and Rosenberg et al. (1991).

The Yuma clapper rail has two major population centers in the United States; the Salton Sea and surrounding wetlands in California, and the lower Colorado River marshes from the border with Mexico to Havasu National Wildlife Refuge. Smaller numbers of rails are found along the lower Gila River in Yuma County, the Phoenix metropolitan area (including portions of the Gila, Salt and Verde rivers) in Maricopa County, Picacho Reservoir in Pinal County, and the Bill Williams River in La Paz County, Arizona (USFWS annual survey data).

Annual survey data compiled by the Fish and Wildlife Service for the period 1990 through 2003 documented between 464 and 1,076 rails (via calls or visual observation) at the survey sites. Surveys in 2003 documented 809 birds. These figures are of actual birds and are not extrapolated to provide a population estimate. The unlisted Yuma clapper rail population in Mexico was estimated to contain 6,300 birds (Hinojosa-Huerta et al. 2000), and the amount of movement between the two populations is unknown.

Declines in actual numbers heard or seen on survey transects since the early 1990's have not been positively connected to any event on the lower Colorado River or Salton Sea; however, changes in habitat quality caused by overgrown marsh vegetation is suspected of influencing rail numbers in those areas. Habitat restoration through mowing or burning over-age cattail stands is under evaluation in several locations to determine future management needs.

New information that may affect the life history of the Yuma clapper rail involves selenium levels in the crayfish, the primary prey species. Levels of selenium in crayfish from Yuma clapper rail habitats were high enough to cause concern for potential reproductive effects (Roberts 1996, King et al. 2000). No adverse effects from selenium have been observed; however, due to the clapper rail's secretive nature, nests are very difficult to find and young birds difficult to observe.

Chiricahua leopard frog

We listed the Chiricahua leopard frog as a threatened species without critical habitat in 2002 (67 FR 40790). We included a special rule to exempt operation and maintenance of livestock tanks on non-Federal lands from the section 9 take prohibitions of the Act. The Ramsey Canyon leopard frog (*R. subaquavocalis*) is similar in appearance to the Chiricahua leopard frog, but it grows larger and has a distinct call that is typically given under water (Platz 1993). Recent genetic work suggests *R. subaquavocalis* and *R. chiricahuensis* may be conspecific (Goldberg et al. 2004).

The Chiricahua leopard frog is an inhabitant of cienegas, pools, livestock tanks, lakes, reservoirs, streams, and rivers at elevations of 3,300 to 8,900 feet in central and southeastern Arizona; west-central and southwestern New Mexico; and in Mexico, northern Sonora, and the Sierra Madre Occidental of northern and central Chihuahua (Platz and Mecham 1984, Degenhardt et al. 1996, Sredl et al. 1997, Sredl and Jennings 2005). In Arizona, slightly more than half of all known historical localities are natural lotic systems, a little less than half are stock tanks, and the remainder are lakes and reservoirs (Sredl et al. 1997). Sixty-three percent of populations extant in Arizona from 1993 to 1996 were found in stock tanks (Sredl and Saylor 1998).

Based on Painter (2000) and the latest information for Arizona, the species is still extant in most major drainages in Arizona and New Mexico where it occurred historically, with the exception of the Little Colorado River drainage in Arizona and possibly the Yaqui drainage in New Mexico. It has also not been found recently in many rivers, valleys, and mountains ranges, including the following in Arizona: White River, West Clear Creek, Tonto Creek, Verde River mainstem, San Francisco River, San Carlos River, upper San Pedro River mainstem, Aravaipa Creek, Santa Cruz River mainstem, Babocomari River mainstem, and Sonoita Creek mainstem. In southeastern Arizona, no recent records (1995 to the present) exist for the following mountain ranges or valleys: Pinaleno Mountains, Peloncillo Mountains, Sulphur Springs Valley, and Huachuca Mountains. The species is absent (as of 2003) from all but one of the southeastern Arizona valley bottom cienega complexes. In many of these regions Chiricahua leopard frogs were not found for a decade or more despite repeated surveys. Recent surveys suggest the species may have recently disappeared from some major drainages in New Mexico (67 FR 40790).

Threats to this species include predation by nonnative organisms, especially bullfrogs, fish, and crayfish; disease; drought; floods; degradation and loss of habitat as a result of water diversions and groundwater pumping, poor livestock management, mining, altered fire regimes due to fire suppression and livestock grazing, development, and other human activities; disruption of

metapopulation dynamics; increased chance of extirpation or extinction resulting from small numbers of populations and individuals; and environmental contamination. Numerous studies indicate that declines and extirpations of Chiricahua leopard frogs are at least in part caused by predation and possibly competition by nonnative organisms, including fish in the family Centrarchidae (*Micropterus* spp., *Lepomis* spp.), bullfrogs, tiger salamanders (*A. t. mavortium*), crayfish (*Orconectes virilis* and possibly others), and several other species of fish (Clarkson and Rorabaugh 1989; Sredl and Howland 1994; Rosen et al. 1994, 1996; Fernandez and Bagnara 1995; Snyder et al. 1996; Fernandez and Rosen 1996, 1998). For instance, in the Chiricahua region of southeastern Arizona, Rosen et al. (1996) found that almost all perennial waters investigated that lacked introduced predatory vertebrates supported Chiricahua leopard frogs. All waters except three that supported introduced vertebrate predators lacked Chiricahua leopard frogs. Sredl and Howland (1994) noted that Chiricahua leopard frogs were nearly always absent from sites supporting bullfrogs and nonnative predatory fish. Rosen et al. (1996) suggested further study was needed to evaluate the effects of mosquitofish, trout, and catfish on frog presence.

A recovery plan has been finalized (USFWS 2007) which calls for reducing threats to existing populations; maintaining, restoring, and creating habitat that will be managed in the long term; translocating frogs to establish, reestablish, or augment populations; building support for the recovery effort through outreach and education; monitoring; research needed to provide effective conservation and recovery; and application of research and monitoring through adaptive management. Recovery actions are recommended in each of eight recovery units throughout the range of the species. Management areas are also identified within recovery units where the potential for successful recovery actions is greatest. Additional information about the Chiricahua leopard frog can be found in Painter (2000), Sredl et al. (1997), Jennings (1995), Degenhardt et al. (1996), Rosen et al. (1994, 1996), Sredl and Howland (1994), Platz and Mecham (1979, 1984), Sredl and Jennings (2005), and USFWS (2007).

Canelo Hills ladies' tresses

We listed the Canelo Hills ladies' tresses as an endangered species without critical habitat under the Act in 1997 (62 FR 665). A recovery plan has not been drafted for this species.

The Canelo Hills ladies' tresses is a member of the orchid family. Populations of this species are known to exist in only five ciénegas in southern Arizona. One population is found in Cochise County and four are found in Santa Cruz County. One population is found at the Arizona Nature Conservancy's Canelo Hills Ciénega. Three other populations are found on private land, one in the San Rafael Valley, one in the Babocomari Ciénega, and one on private property near Turkey Creek. The fourth population is on Coronado National Forest land in the Canelo Hills.

Estimating Canelo Hills ladies' tresses population size and stability is difficult because non-flowering plants are very hard to find in the dense herbaceous vegetation in which they typically occur, and yearly counts underestimate the population because dormant plants are not counted. McClaran and Sundt (1992) monitored and marked individuals in a Canelo Hills ladies' tresses population during two three-year periods. They concluded that the subpopulations at both

monitored sites were stable between 1987 and 1989, although Newman (1991) later reported that one monitored site was reduced to one non-flowering plant in 1991.

All populations of Canelo Hills ladies' tresses occur in ciénega habitats where scouring floods are very unlikely (Newman 1991). Soils supporting the populations are finely grained, highly organic, and seasonally or perennially saturated. It is found intermixed with tall grasses and sedges at about 5,000 feet in elevation. Springs are the primary water source, but a creek near one locality contributes near-surface groundwater (McClaran and Sundt 1992).

Threats to the Canelo Hills ladies' tresses include groundwater pumping, water diversions, sand and gravel mining, recreation impacts, illegal collection, and invasion of ciénega habitats by nonnative plant species, such as Johnson grass and Bermuda grass (*Cynodon dactylon*)(62 FR 665). Nonnative Johnson grass (*Sorghum halapense*) is invading one *Spiranthes* site (Fishbein and Gori 1994). This tall grass forms a dense monoculture, displacing less competitive native plants. If Johnson grass continues to spread, the Canelo Hills ladies' tresses population at this site may be lost (D. Gori, pers. comm., 1994). The effect of livestock grazing on the Canelo Hills ladies' tresses is unclear. A *Spiranthes* population growing at a site grazed for more than 100 years was found to be larger and more vigorous than a population growing at a site ungrazed since 1969 (Newman 1991, McClaran and Sundt 1992); however, this may no longer be the case as the management at the grazed site has changed dramatically in recent years. The Canelo Hills ladies' tresses, like many species in the genus, shows an affinity for habitats with sparse herbaceous cover (McClaran and Sundt 1992); which moderate livestock grazing can promote. The species would likely be adversely affected by heavy livestock grazing; however, maintenance of viable populations is probably compatible with well-managed grazing. Mowing of pastures, particularly when the species is flowering, can be very detrimental, and may prevent seed set, and could result in mortality of plants. Limited numbers of populations and individuals threatens this taxon with demographic and environmental extinction as a result of stochastic events that are often exacerbated by habitat disturbance. For instance, restriction of the species to a relatively small area in southeastern Arizona increases the chance that a single environmental catastrophe, such as a severe tropical storm or drought, could eliminate populations or cause extinction.

Gila chub

The Gila chub was listed as endangered with critical habitat in 2005 (70 FR 66664). Historically, Gila chub have been recorded from rivers, streams, and spring-fed tributaries throughout the Gila River basin in southwestern New Mexico, central and southeastern Arizona, and northern Sonora, Mexico (Miller and Lowe 1964, Rinne and Minckley 1970, Minckley 1973, Rinne 1976, DeMarais 1986, Weedman et al. 1996). Today the Gila chub has been restricted to small, isolated populations scattered throughout its historical range.

Critical habitat for Gila chub includes approximately 163 miles of stream reaches in Arizona and New Mexico (70 FR 66664). There are seven primary constituent elements. Constituent elements include those habitat features required for the physiological, behavioral, and ecological needs of the species. For Gila chub, these include:

1) Perennial pools, areas of higher velocity between pools, and areas of shallow water among plants or eddies all found in headwaters, springs, and cienegas, generally of smaller tributaries;

2) Water temperatures for spawning ranging from 63 to 75 °F (17-24 °C), and seasonally appropriate temperatures for all life stages (varying from about 50 to 86 °F [10 °C to 30 °C]);

3) Water quality with reduced levels of contaminants, including excessive levels of sediments adverse to Gila chub health, and adequate levels of pH (e.g. ranging from 6.5-9.5), dissolved oxygen (e.g. ranging from 3.0-10.0 ppm) and conductivity (e.g. 100-1000 mmhos);

4) Food base consisting of base consisting of invertebrates (e.g. aquatic and terrestrial insects) and aquatic plants (e.g. diatoms and filamentous green algae);

5) Sufficient cover consisting of downed logs in the water channel, submerged aquatic vegetation, submerged large tree root wads, undercut banks with sufficient overhanging vegetation, large rocks and boulders with overhangs, a high degree of streambank stability, and a healthy, intact riparian vegetation community;

6) Habitat devoid of nonindigenous aquatic species detrimental to Gila chub or habitat in which detrimental nonindigenous species are kept at a level that allows Gila chub to continue to survive and reproduce; and

7) Streams that maintain a natural flow pattern including periodic flooding.

Gila chub currently occur in Turkey Creek in New Mexico, and in about 24 streams in the Agua Fria, Gila, Santa Cruz, and San Pedro drainages in Arizona (70 FR 66664). Gila chub also may still occur in Ciénega los Fresnos and Ciénega la Cienegita, Mexico (Weedman et al. 1996), although recent surveys have not detected them, and nonnative fish are present (Service files).

Of all the known extant Gila chub populations, most are small; about two thirds are considered stable but threatened, and a third are unstable and threatened (Weedman et al. 1996; 70 FR 66664). Reestablishment of Gila chub has been attempted in four Arizona sites; three are believed to be extant, Romero Canyon in southern Arizona, and Lousy Canyon and Larry Creek within the Agua Fria National Monument (Desert Fishes Team 2006).

Razorback sucker

The razorback sucker was listed as endangered in 1991 (56 FR 54957). Critical habitat for the razorback sucker was designated in 1994 (59 FR 13374), and includes rivers in Colorado, Utah, portions of the Colorado River in Arizona, California, and Nevada, and portions of the Gila, Salt, and Verde rivers in Arizona (59 FR 13374). The Razorback Sucker Recovery Plan (USFWS 1998) was updated and supplemented by the Razorback Sucker (*Xyrauchen texanus*) Recovery Goals (USFWS 2002b).

The razorback sucker is a catostomid fish endemic to the Colorado River Basin. Small populations of razorback suckers exist in the Upper Basin in the Green River Basin (the Green, Duchesne, White, and Yampa rivers) and the mainstem Colorado River in Colorado and Utah. In the Lower Basin, wild razorback sucker populations are known from Lake Mead and Lake Mohave. A very few wild individuals may still be found below Lake Mohave to Imperial Dam. The Lake Mead population is estimated at 100 to 200 individuals (Welker and Holden 2003, 2004). None of the populations are confirmed to be self-sustaining, with recent recruitment of wild-bred young only documented in Lake Mead (most recently in Welker and Holden 2004). Some recruitment was assumed for a portion of the middle Green River (Modde et al. 1996), and captures of small razorback suckers in canals below Parker Dam on the Colorado River also represent some recruitment occurring in this area (summarized in USFWS 2001). The recovery goals (USFWS 2002b) contain the most recent life history information on the species. Material in that publication is incorporated by reference.

Predation and competition from nonnative fish species introduced into the Colorado River basin pose the greatest threat to the razorback sucker (Marsh and Brooks 1989). Other significant threats to the razorback sucker include loss of riverine and backwater habitats, loss of connectivity of habitats, and changed inflows due to water-development. Effects of man-made pharmaceutical and personal care chemicals, particularly endocrine compounds, may be a threat to maturation and reproduction of adult razorbacks (Baker and Marr 2003).

Implementation of recovery actions in the Lower Basin is accomplished through the cooperative efforts of Federal, state, and university entities, such as the Native Fish Work Group, and a considerable amount of the ongoing conservation is the result of conservation measures and reasonable and prudent alternatives contained in Federal projects and biological opinions (Minckley et al. 1991, Desert Fishes Team 2006). In addition to stocking sub-adult fish into Lake Mohave, Lake Havasu, and the reach below Parker Dam, there is also ongoing research into dispersal of stocked fish into the system, habitat preferences and use, monitoring of spawning at Lake Mead and research into the reasons for successful recruitment to that population, and development of isolated habitats like that at Cibola High Levee Pond to provide secure areas for self-sustaining populations.

Huachuca springsnail

We conducted a status review and published a 12-month petition finding in 1997, as the Huachuca springsnail changed status from a category 2 species to a candidate species (62 FR 49397). The Huachuca springsnail is a small (1.7 - 3.2 mm [0.05-0.13 in] tall), aquatic snail with three to five somewhat convex whorls on the shell. Identification must be verified by characteristics of reproductive organs.

The Huachuca springsnail occurs in springs or ciénegas at 1,372 to 1,829 m (4,500 to 7,200 ft) elevation in southeastern Arizona and adjacent portions of Sonora, Mexico, including nine sites in the upper San Pedro River drainage (Huachuca Mountains, Canelo Hills, San Rafael Valley -Arizona/Sonora), and four in the upper Santa Cruz River drainage (Sonoita Creek drainage, San Rafael Valley, Santa Cruz River drainage - Sonora). Springs and ciénegas

inhabited by the snail are typically marshy areas characterized by various aquatic and emergent plant species that occur within plains grassland, oak and pine-oak woodlands, and coniferous forest vegetation communities. The species is typically found in the shallower areas of springs or ciénegas, often in rocky seeps at the spring source. In Arizona, the species is found in Cochise and Santa Cruz counties. Many potentially suitable sites in the southern half of the Huachuca Mountains have not been surveyed for Huachuca springsnail.

The Huachuca springsnail is threatened by loss or degradation of spring and ciénega habitat due to improper grazing, timber harvest, altered fire regimes, drought, mining, water developments, recreation, and catastrophic fire resulting from human-caused alterations of fire regimes. Extirpation of a population could occur as a result of major storms, drought or climate change, fire, or other forms of environmental stochasticity. Because populations are isolated, once extirpated, sites are unlikely to be recolonized without active management. Small populations are also subject to genetic deterioration and demographic variability, which increases the likelihood of extinction.

Huachuca water umbel

We listed the Huachuca water umbel as an endangered species in 1997 (62 FR 665). Critical habitat was designated on the upper San Pedro River, Garden Canyon on Fort Huachuca, and other areas of the Huachuca Mountains, San Rafael Valley, and Sonoita Creek in 1999 (64 FR 37441). The umbel is an herbaceous, semiaquatic perennial plant with slender, erect leaves that grow from creeping rhizomes.

Huachuca water umbel has been documented from 27 sites in Santa Cruz, Cochise, and Pima counties, Arizona, and in adjacent Sonora, Mexico, west of the continental divide (Warren et al. 1989, Saucedo 1990, Warren et al. 1991, Warren and Reichenbacher 1991, Haas and Frye 1997). The plant has been extirpated from six of the 27 sites. The 21 extant sites occur in five major watersheds - San Pedro River, Santa Cruz River, Rio Concepcion, Rio Yaqui, and Rio Sonora. All sites are between 3,500 and 6,500 feet in elevation.

Huachuca water umbel has an opportunistic strategy that ensures its survival in healthy riverine systems, cienegas, and springs. In upper watersheds that generally do not experience scouring floods, the umbel occurs in microsites where interspecific plant competition is low. At these sites, the umbel occurs on wetted soils interspersed with other plants at low density, along the periphery of the wetted channel, or in small openings in the understory. The upper Santa Cruz River and associated springs in the San Rafael Valley, where a population of Huachuca water umbel occurs, is an example of a site that meets these conditions. The types of microsites required by the umbel were generally lost from the main stems of the San Pedro and Santa Cruz rivers when channel entrenchment occurred in the late 1800s to early 1900s. Habitat on the upper San Pedro River is recovering, and Huachuca water umbel has recently been found along short reaches of the main channel.

In stream and river habitats, Huachuca water umbel can occur in backwaters, side channels, and nearby springs. After a flood, it can rapidly expand its population and occupy disturbed habitat

until interspecific competition exceeds its tolerance. This response was recorded at Sonoita Creek, when a scouring flood removed about 95 percent of the Huachuca water umbel population (Gori et al. 1990). One year later, the umbel had recolonized the stream and was again codominant with nonnative watercress, *Rorippa nasturtium-aquaticum* (Warren et al. 1991).

Limited numbers of populations and the small size of populations make the Huachuca water umbel vulnerable to extinction as a result of stochastic events that are often exacerbated by habitat disturbance. For instance, the restriction of this taxon to a relatively small area in southeastern Arizona and adjacent Sonora increases the chance that a single environmental catastrophe, such as a severe tropical storm or drought, could eliminate populations or cause extinction. Populations are, in most cases, isolated as well, which makes the chance of natural recolonization after extirpation less likely. Small populations are also subject to demographic and genetic stochasticity, which increases the probability of population extirpation (Wilcox and Murphy 1985, Shafer 1990).

The constituent elements identified in the final rule designating critical habitat provide for permanent water, stable stream channels, and riparian plant communities composed of native plant species. The constituent elements also provide for continuous reaches of habitat to allow *Lilaeopsis* populations to expand and contract in response to flood events. The primary constituent elements of umbel critical habitat are:

1. Sufficient perennial base flows to provide a permanently or nearly permanently wetted substrate for growth and reproduction of Huachuca water umbel;

2. A stream channel that is relatively stable, but subject to periodic flooding that provides for rejuvenation of the riparian plant community and produces open microsites for water umbel expansion;

3. A riparian plant community that is relatively stable over time and in which nonnative species do not exist or are at a density that has little or no adverse effect on resources available for water umbel growth and reproduction; and

4. In streams and rivers, refugial sites in each watershed and in each reach, including but not limited to springs or backwaters of mainstem rivers, which allow each population to survive catastrophic floods and recolonize larger areas.

Sonora tiger salamander

The Sonora tiger salamander was listed as endangered in 1997 (62 FR 665) without critical habitat. A final recovery plan was completed in September 2002 (USFWS 2002c).

The Sonora tiger salamander is known from about 53 breeding localities, although not all are currently occupied (Collins and Jones 1987, Collins 1996, Abbate 1998, USFWS 2002c and files). During intensive surveys in 1997, from one to 150 Sonora tiger salamanders were found at 25 stock tanks (Abbate 1998). Populations and habitats are dynamic, thus the number and

location of extant aquatic populations change over time, as exhibited by the differences between survey results in 1985 and 1993 to 1996 (Collins and Jones 1987, Collins 1996, James Collins, pers. comm. 1996). In 1999, the lab of Dr. James Collins, Arizona State University, found Sonora tiger salamanders at 17 localities (Collins 1999). During surveys by the Arizona Game and Fish Department from 2001 to 2006, Sonora tiger salamanders were found at 37 of 139 stock tanks, which were sampled from 1 to 7 times each. At 23 of 29 tanks where salamanders were found, and which were sampled more than once, salamanders were not found on at least one visit. All sites where Sonora tiger salamanders have been found are located in Arizona in the Santa Cruz and San Pedro River drainages, including sites in the San Rafael Valley and adjacent portions of the Patagonia and Huachuca mountains in Santa Cruz and Cochise counties.

The entire range of the species in Arizona is covered by the SHA. All confirmed historical and extant aquatic populations are found in cattle tanks or impounded cienegas within 19 miles of Lochiel, Arizona. Salamanders collected from a cienega at Rancho Los Fresnos in the San Rafael Valley, Sonora, may be *A. t. stebbinsi* (Varela-Romero et al. 1992). However, surveys during 2006 failed to locate additional salamanders, and most waters on the ranch are now occupied by nonnative bullfrogs, crayfish, green sunfish (*Lepomis cyanella*), or black bullhead (USFWS files and trip reports).

Historically, the Sonora tiger salamander probably inhabited springs, cienegas, and possibly backwater pools of the Santa Cruz River and streams in the San Rafael Valley where permanent or nearly permanent water allowed survival of mature branchiates. The Sonora tiger salamander apparently has opportunistically taken advantage of available stock tank habitats as natural habitats disappeared (Hendrickson and Minckley 1984) or were invaded by nonnative predators with which the salamander cannot coexist (USFWS 2002c).

Although most records for Sonora tiger salamanders occur at stock tanks where breeding occurs, terrestrial metamorphs potentially may wander considerable distances from these aquatic habitats, and are occasionally encountered in upland habitats. A Sonora tiger salamander was captured in a pit fall trap at Oak Spring in Copper Canyon, Huachuca Mountains. The nearest known breeding site is about 0.6 mile to the south, suggesting the salamander may have moved at least that far. Capture in a pit fall trap also confirms that the individual was surface active. In other subspecies of *A. tigrinum*, metamorphs may disperse hundreds of meters from the breeding pond, or may remain nearby (Gehlbach et al. 1969, Petranka 1998). Of hundreds of marked *A. t. nebulosum* in northern Arizona, two were found to move from 0.9 to 1.2 miles to new ponds (J. Collins, pers. comm., 1998). On Fort Huachuca, Sheridan Stone (pers. comm., 1998) reported finding terrestrial tiger salamanders (probably *A. t. mavortium*) 1.9 to 2.5 miles from the nearest known breeding pond. Because of the arid nature of the environments in the region where the subspecies occurs, if salamanders move very far from breeding ponds, they may use wet canyon bottoms as movement corridors.

Primary threats to the salamander include predation by nonnative fish and bullfrogs, diseases, catastrophic floods and drought, illegal collecting, introduction of other subspecies of salamanders that could genetically swamp *A. t. stebbinsi* populations, and stochastic extirpations or extinction characteristic of small populations. Predation by catfish, bass (*Micropterus* spp.),

mosquitofish, and sunfish can eliminate stock tank populations of Sonora tiger salamander (Collins et al. 1988, J. Snyder, Arizona State University, pers. comm., 1996). The salamanders can apparently coexist with bullfrogs, but bullfrogs prey on salamanders (J. Snyder, pers. comm., 1996) and perhaps if they are present in sufficient densities could reduce or eliminate salamander populations. Tadpoles of wood frogs (*Rana sylvatica*), are known to feed on spotted salamander (*A. maculatum*) eggs (Petranka et al. 1998), but under experimental conditions bullfrog tadpoles do not feed on viable salamander eggs or hatchlings (Collins 1996, J. Collins, pers. comm., 1996). Recent genetic analysis confirmed that barred salamanders (*A. t. mavortium*) or hybrids between barred salamanders and Sonora tiger salamanders are present at seven stock tanks along Highway 83 and near Parker Canyon Lake in the San Rafael Valley (Ziemba et al. 1998, Storfer et al. 2004). A salamander population in Garden Canyon, Fort Huachuca, near the crest of the Huachuca Mountains, may contain hybrids, as well (Storfer et al. 1999). Barred salamanders are likely present due to their use as fish bait in and around Parker Canyon Lake. For further information on the ecology, taxonomy, range, and threats to this subspecies, refer to Collins (1981, 1996), Collins and Jones (1987), Collins et al. (1988, 2003), Gehlbach (1967), Jancovich et al. (1997, 1998, 2005), Jones et al. (1988,1995), Lowe (1954), Snyder et al. (1996, 1998), Storfer (2003), Storfer et al. (2004), and USFWS (2002c).

Southwestern willow flycatcher

The southwestern willow flycatcher was listed as endangered, without critical habitat in 1995 (60 FR 10694). Critical habitat was later designated in 1997 (62 FR 39129). A correction notice was published in the Federal Register in August 1997 to clarify the lateral extent of the designation (62 FR 44228). In 2001, the 10th Circuit Court of Appeals set aside designated critical habitat in those states under the 10th circuit's jurisdiction (New Mexico). The FWS decided to set aside critical habitat designated for the southwestern willow flycatcher in all other states (California and Arizona) until we reassessed the economic analysis. In 2005, we re-designated critical habitat for the southwestern willow flycatcher (70 FR 60866). A total of 737 river miles across southern California, Arizona, New Mexico, southern Nevada, and southern Utah were included in the final designation.

A final recovery plan for the southwestern willow flycatcher was released in 2002 (USFWS 2002a). The recovery plan describes the reasons for endangerment and the current status of the species, addresses important recovery actions, includes detailed issue papers on management issues, and provides recovery goals. Recovery is based on reaching numerical and habitat-related goals for each specific Management Unit established throughout the subspecies range and establishing long-term conservation plans (USFWS 2002a).

Range wide, the population is comprised of extremely small, widely separated breeding groups including unmated individuals. Rangewide, 83 percent of all sites from 1993 to 2004 had 0 to 5 flycatcher territories present (Durst et al. 2005). Removing the extirpated sites, the percentages are similar; 69 percent of all sites have between one and five territories. Conversely, across the southwestern willow flycatcher's range, there are only three percent of all sites with greater than 50 territories (Durst et al. 2005).

Historically, the southwestern willow flycatcher declined in extent of range occupied and population size as a result of habitat loss, modification, and fragmentation. Known numbers of southwestern willow flycatcher territories have increased to over 1200 pairs throughout its range since the bird was listed in 1995, surpassing the high end of the 1000 pairs estimated by Unitt (1987). About 40 percent of all the known breeding pairs are found at three locations throughout the subspecies range (Cliff/Gila Valley, New Mexico; and Roosevelt Lake and Gila/San Pedro river confluence, Arizona).

Water diversions, agricultural return flows, groundwater pumping, habitat clearing, flood control projects, development, livestock grazing, dam operations, and changes in annual flows due to off stream uses of water have affected the ability of the aquatic and adjacent ecosystems to support native fish, plants, and wildlife. Riparian ecosystems by nature are dynamic, with their distribution in time and space governed mostly by flood events and flow patterns. Current conditions along southwestern rivers and streams are such that normal flow patterns have been greatly modified, flood events are more catastrophic as a result of degraded watershed conditions, stream channels are highly degraded, floodplains and riparian communities are reduced in extent, wildfires in riparian ecosystems are increasing, and the species composition of riparian communities are modified with nonnative plant species. Southwestern willow flycatcher habitat loss and fragmentation can lead to increased brood parasitism and nest predation. These conditions have significantly diminished the potential for southwestern rivers and streams to develop suitable nesting habitat for the southwestern willow flycatcher and for those ecosystems to remain intact and productive for nesting southwestern willow flycatchers.

Our June 27, 2006, BO on the effects of the proposed construction of the Florence-Kelvin Bridge over the Gila River (22410-2006-F-0429) included a detailed Status of the Species for the Southwestern Willow Flycatcher. This BO is available on our website at http://www.fws.gov/southwest/es/arizona under Document Library; Section 7 Biological Opinions. We incorporate that status discussion by reference.

Critical habitat for southwestern willow flycatcher in Arizona includes portions of the Virgin River Gorge, Verde River, Gila River, Salt River, Tonto Creek, San Pedro River, Little Colorado River, and Big Sandy River. The primary constituent elements of critical habitat include:

- Riparian habitat in a dynamic successional riverine environment (for nesting, foraging, migration, dispersal, and shelter) that comprises:

    - Various species of native willow (*Salix* spp.), boxelder (*Acer negundo*), tamarisk (*Tamarix ramosissima*), Russian olive (*Eleagnus angustifolia*), buttonbush (*Cephalanthus occidentalis*), cottonwood (*Populus fremontii*), stinging nettle (*Urtica dioica*), alder (*Alnus* spp.), velvet ash (*Fraxinus velutina*), poison hemlock (*Conium maculatum*), blackberry (*Rubus ursinus*), seep willows (*Baccharis* spp.), oaks (*Quercus* spp.), rose (*Rosa* spp.), sycamore (*Platinus wrightii*), false indigo (*Amorpha californica*), Pacific poison ivy (*Toxicodendron diversilobum*), grape (*Vitus arizonica*), Virginia creeper (*Parthenocissus quinquefolia*), Siberian elm (*Ulmus pumila*), and walnut (*Juglans hindsii*);

- Dense riparian vegetation with thickets of trees and shrubs ranging in height from 2 to 30 m (6-98'). Lower-stature thickets (2-4 m or 6-13' tall) are found at higher elevation riparian forests, and tall stature thickets are found at middle- and lower elevation riparian forests;

- Areas of dense riparian foliage at least from the ground level up to approximately 4 m (13 ft) above ground or dense foliage only at the shrub level, or as a low, dense tree canopy;

- Sites for nesting that contain a dense tree or shrub canopy (the amount of cover provided by tree and shrub branches measured from the ground) (i.e., tree or shrub canopy densities ranging from 50-100 percent);

- Dense patches of riparian forests that are interspersed with small openings of open water or marsh, or shorter and sparser vegetation that creates a mosaic that is not uniformly dense. Patch size may be as small as 0.1 ha (0.25 ac) or as large as 70 ha (175 ac); and

- A variety of insect prey populations found within or adjacent to riparian floodplains or moist environments, including flying ants, wasps, and bees (Hymenoptera); dragonflies (Odonata); flies (Diptera); true bugs (Hemiptera); beetles (Coleoptera); butterflies and moths and their larvae (Lepidoptera); and spittlebugs (Homoptera)(70 FR 60886).

Although several recovery actions are underway, other activities continue to adversely affect the distribution and extent of all stages of flycatcher habitat throughout its range (development, urbanization, grazing, recreation, native and nonnative habitat removal, dam operations, river crossings, ground and surface water extraction, etc.). Stochastic events also continue to change the distribution, quality, and extent of southwestern willow flycatcher habitat.

Anticipated, actual, or temporary loss of flycatcher habitat due to Federal or federally permitted projects (e.g. modification of Roosevelt Dam, operation of Lower Colorado River dams) has resulted in BOs and Habitat Conservation Plans (HCP) that led to acquisition, development, and protection of property specifically for the southwestern willow flycatcher to remove jeopardy, and mitigate, reduce, or minimize take or adverse affects. A small portion of the lower San Pedro River was acquired by the Bureau of Reclamation as a result of raising Roosevelt Dam and is now currently under the management of The Nature Conservancy. Commitments to acquire and manage unprotected habitat specifically for breeding southwestern willow flycatchers have been made for loss of habitat along the Lower Colorado River (Operations of Colorado River dams and 4.4 Plan/Change in Points of Diversion, Lower Colorado River Multi-Species Conservation Plan (MSCP), Tonto Creek and Salt River (raising of Roosevelt Dam, operation of Roosevelt Dam) in Arizona, and Lake Isabella, California (operation of dams). The Roosevelt Lake HCP completed by Salt River Project has resulted in acquisition of over 1,000 acres along the Verde River, San Pedro River, and Gila River. The Army Corps of Engineers has acquired about 1,000 acres along the South Fork Kern River to minimize the effects of operations of

Isabella Dam. Various Regional HCPs have been developed in southern California that have protected southwestern willow flycatcher habitat (San Diego MSCP, Western Riverside County HCP, Carlsbad Habitat Management Plan).

Western yellow-billed cuckoo

We assigned candidate status to the western continental United States distinct population segment of the yellow-billed cuckoo (western yellow-billed cuckoo) in 2001 (66 FR 38611). The Distinct Population Segment boundary includes all yellow-billed cuckoos west of the Continental Divide and west of the eastern edge of the Rio Grande drainage, excluding the Pecos River drainage, but including the Sangre de Cristo Mountains.

Historically, the western yellow-billed cuckoo occupied and bred in riparian zones from western Washington (possibly southwestern British Columbia) to northern Mexico, including Oregon, Washington, southwestern Idaho, California, Nevada, Utah, western Colorado, Arizona, New Mexico, and western Texas. Today, the species is absent from Washington, Oregon, and most of California, is likely extirpated in Nevada, is rare in Idaho and Colorado, and occurs in the balance of its range in riparian habitats that are much reduced from their previous extent and are heavily affected by human use (66 FR 38611).

The western yellow-billed cuckoo is associated primarily with cottonwood-willow dominated riparian habitats (Hamilton and Hamilton 1965, Gaines and Laymon 1984, Halterman and Laymon 1986, Halterman 1991, Halterman and Laymon 1994). Cottonwood-willow is the predominant and preferred habitat, but very tall screwbean (*P. pubescens*)-honey mesquite stands are also used. In addition, western yellow-billed cuckoos have been found to use a mixture of salt cedar and cottonwood/willows (Corman and Magill 2000). Gaines (1974) found that vegetation density, distance to water, and the length and width of the habitat area were important characteristics when surveying for western yellow-billed cuckoos. Western yellow-billed cuckoos breed in large blocks of riparian habitats (particularly woodlands with cottonwoods and willows). Dense understory foliage appears to be an important factor in nest site selection, and cottonwood trees are an important element of foraging habitat in areas where the species has been studied in California (Halterman 1991).

Arizona is thought to contain the largest remaining western yellow-billed cuckoo population in the western States (66 FR 38611). Currently in Arizona, western yellow-billed cuckoos occur in a scattered fashion throughout the central, east-central, west central, and southeastern parts of the State, with the majority of known populations occurring along the San Pedro, Verde, and Agua Fria rivers and Ciénega Creek in Pima, Pinal, Cochise, and Yavapai counties, and Sonoita Creek in Santa Cruz County (Corman and Magill 2000).

Quantitative data on the decline of the western yellow-billed cuckoo are lacking, but significant range data have been documented for the distinct population segment (USFS 2004:221). In addition to the species' absence and rarity in Washington, Oregon, Idaho, Colorado, and Nevada, the three remaining western yellow-billed cuckoo-inhabited states (Arizona, New Mexico, and California) demonstrate a decline in both range and abundance of the distinct population

segment. However, New Mexico presently supports a relatively abundant population within its river systems.

Our June 10, 2005, Programmatic Biological and Conference Opinion for the Continued Implementation of the Land and Resource Management Plans for the Eleven National Forests and National Grasslands of the Southwestern Region (AESO/SE 02-22-03-F-0366) included a detailed Status of the Species for the western yellow-billed Cuckoo. This BO is available on our website at http://www.fws.gov/southwest/es/arizona/ under Document Library; Section 7 Biological Opinions. We incorporate that status discussion by reference.

Headwater chub

We conducted a status review and published a 12-month petition finding in 2006 (71 FR 26007) that listing was warranted, but precluded by other agency priorities. Headwater chub (as *G. robusta grahami*) was considered a threatened species by the American Fisheries Society on its list of fishes receiving legal protection or of special concern in 1987 (Johnson 1987). Since then, declines of the headwater chub have been further noted both in the scientific peer-reviewed literature (Bestgen and Propst 1989) and in State agency reports (Girmendonk and Young 1997, Brouder et al. 2000, Bezzerides and Bestgen 2002, Voeltz 2002).

The historical distribution of headwater chub in the lower Colorado River basin is poorly documented, due to the paucity of early collections and the widespread anthropogenic changes (i.e., habitat alteration and nonnative species introductions [Girmendonk and Young 1997]) to aquatic ecosystems beginning in the mid 19th century. The headwater chub was historically considered common throughout its range (Minckley 1973, Holden and Stalnaker 1975, Propst 1999). Voeltz (2002), estimating historical distribution based on museum collection records, agency database searches, literature searches, and discussion with biologists, found that headwater chub likely occurred in a number of tributaries of the Verde River, most of the Tonto Creek drainage, much of the San Carlos River drainage, and parts of the upper Gila River in New Mexico. Voeltz (2002) estimated that headwater chub historically occupied about 312 mi (500 km) in Arizona and New Mexico.

The species currently occurs in the same areas, but has a smaller distribution. In Arizona, four tributaries of the Verde River (Fossil Creek, the East Verde River, Wet Bottom Creek, and Deadman Creek), and Tonto Creek and seven of its tributaries (Buzzard Roost, Gordon, Gun, Haigler, Horton, Marsh, Rock, and Spring Creeks), are currently occupied; and in New Mexico, the upper East Fork, lower Middle Fork, and lower West Forks of the Gila River (Voeltz 2002; S. Stefferud, pers. comm. 2005; Desert Fishes Team 2006) are currently occupied by headwater chub. Headwater chub may still occur in parts of the San Carlos River basin; however recent survey information for these streams is unavailable (Minckley and DeMarais 2000, Voeltz 2002).

Headwater chub occur in the middle to upper reaches of moderately-sized streams (Minckley and Demaris 2000). Bestgen and Propst (1989) examined status and life history in the Gila River drainage in New Mexico and found that headwater chub occupied tributary and mainstem habitats in the upper Gila River at elevations of 4,347 ft (1,325 m) to 6,562 ft (2,000 m). Typical

adult microhabitat consists of near-shore pools adjacent to swifter riffles and runs over sand and gravel substrate, with young of the year and juvenile headwater chub using smaller pools and areas with undercut banks and low current (Anderson and Turner 1978, Bestgen and Propst 1989). Neve (1976) reported that the diet of headwater chub included aquatic insects, ostracods (small crustaceans), and plant material.

The most comprehensive and recent of the status reports concerning headwater chub was completed by the AGFD in 2002, and peer-reviewed by Federal agency personnel, university researchers, and experts on the headwater chub (Voeltz 2002). Stream-specific distribution and status information for headwater chub populations in the lower Colorado River basin was gathered from published literature; unpublished agency reports, records, manuscripts, and files; scientific collecting permit reports; communications with knowledgeable biologists; and academic databases. Based on this comprehensive information of all available current and historical survey records, AGFD estimated historical and current ranges of the headwater chub and found that the species had declined significantly from historical levels.

Voeltz (2002) reviewed the 19 currently known populations of headwater chub and found that one was stable-secure, six were stable-threatened, six were unstable-threatened, three were extirpated, and three were unknown. Deadman Creek, the one population that Voeltz considered stable-secure, has since been invaded by nonnative green sunfish (J. Voeltz, pers. comm., 2003), and should now be considered stable-threatened. Headwater chub are known to occupy only 40 percent of their former range, and they have an unknown distribution in another 10 percent of their former range. Based on the best available scientific information, the headwater chub occurs in 16 of 19 known populations, which occur in fragmented and isolated stream segments and represent only 40 to 50 percent of the species' former range (about 125 mi (200 km) of 312 mi [500 km]) in Arizona and New Mexico (Voeltz 2002, Desert Fishes Team 2003).

Populations of headwater chub are found in four separate drainage basins that are isolated from one another. Within these basins, there is further fragmentation and isolation of some populations. We consider a particular basin to be at risk of extirpation if there are fewer than two stable-secure populations because any single population can be eliminated by stochastic events or catastrophic disturbance, such as fire (see Meffe and Carroll 1994). According to information in Voeltz (2002), and survey information collected since then, headwater chub cannot be considered secure in any drainage because there are no stable-secure populations in any drainage.

In summary, the data show that the status of headwater chub is poor and declining. It has been extirpated from about 50 percent of its historical range; all 16 known populations are experiencing threats, and it is no longer considered secure in any part of its historical range (Voeltz 2002; J. Voeltz, pers. comm., 2003). Although 6 of the 16 extant populations are considered "stable" based on abundance and evidence of recruitment, we believe all six of these populations have a high likelihood of becoming extirpated in the foreseeable future, primarily because at least one, and in most cases several, nonnative aquatic species that have been implicated in the decline of headwater chub are present in these streams (Voeltz 2002).

This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the Act to complete the following analysis with respect to critical habitat.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all Federal, State, or private actions in the action area, the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation, and the impact of State and private actions which are contemporaneous with the consultation process. The SHA will cover habitats within the historical ranges of the topminnow and pupfish in Arizona. The programmatic nature of the proposed SHA makes it impossible to specifically characterize each site that may be used. Although it is unknown at this time which particular sites may be covered by the SHA, and the discussion of the affected environment and the environmental consequences must be broad, where possible, site-specific resources and impacts will be addressed.

The vast majority of SHA sites will be isolated from all other waters and may occur anywhere from urban to wilderness locations. If fish have the potential to naturally spread to adjacent landowner's properties, that site will not be used without the other landowner's permission. This will eliminate potential conflicts with adjacent landowners that do not wish to participate in the SHA. However, if adjacent landowners are willing to participate, these habitats will be used. In certain cases, coordination with Federal land management agencies may also be appropriate if fish have the potential to naturally disperse from habitats covered under this SHA onto Federal lands.

Europeans have influenced Southern Arizona for hundreds of years, and Native Americans have done so for much longer (Hastings and Turner 1965, Bahre and Hutchinson 1985, Bahre 1991, Tellman et al. 1997). Often-cited human impacts in the area include vegetation type conversion, dewatering surface waters and aquifers, erosion and channel downcutting, loss or reduction of native species, introduction and spread of nonnative species, and habitat loss. As with many of the river basins in the southwest, aquatic habitats and fish communities in the Gila basin have changed from historical conditions (Miller 1961, de la Torre 1970, Naiman and Soltz 1981, Miller et al. 1989, Minckley and Deacon 1991, Rinne and Minckley 1991). Aquatic habitats have been fragmented and reduced in quantity and quality due to diversion, groundwater mining, and natural and human-caused changes in the watershed and hydrologic regime (de la Torre 1970, Davis 1982, Tellman et al. 1997).

With the arrival of Europeans, major alterations began in the Gila River basin. Beaver, which were a major influence on the structure of the Gila basin aquatic ecosystem, were diminished almost to extirpation. The introduction of livestock began very early and resulted in substantial alteration of the watershed and its soil and vegetation (York and Dick Peddie 1969, Humphrey 1987, Bahre 1991). Croplands increased, often along river terraces, resulting in destabilization and erosion of floodplains (Leopold 1946, Rea 1983). Roads and trails caused extensive erosion and substantial destruction of river channels (Leopold 1921, Dobyns 1981, Rutman 1997). Diversion of water, which was already practiced by Native Americans in some areas, increased in

those areas and was initiated in others (Tellman et al. 1997). As diversion and irrigation increased, the demand for water storage increased, resulting in a variety of large and small dams and impoundments (Haddock 1980). By the mid 1900's, large stretches of river in the Gila basin no longer had perennial flow, and the remaining areas were separated by long dry stretches, dams, and impounded water (Brown et al. 1977, Rea 1983, Hendrickson and Minckley 1984, Tellman et al. 1997). As a result of these changes, the riverine habitats of the Gila basin became fragmented, and connectivity was substantially reduced. Populations of fish or other aquatic species eradicated by perturbation were not replaced by colonization. Habitat fragmentation contributes to the genetic isolation of populations. Population fragmentation can reduce genetic variation and viability. This, in turn, can increase the risk of extinction by reducing survival, reproduction, and dispersal. Isolation also precludes re-colonization should one or more populations be eliminated. When an inhospitable environment that imposes a high degree of threat on the remnant habitat surrounds isolated populations, these risks are compounded. This fragmentation has been a major factor in the decline of almost all of Arizona's native aquatic fauna and has resulted in the existing pattern, where native aquatic species, particularly rarer ones, tend to be isolated in small headwater areas scattered across the tributaries of the basin (Hendrickson and Minckley 1984, Minckley 1985).

Human disturbances of the watershed, floodplain, and stream channel change many of the factors determining channel configuration. Increased sediment off the watershed is a common result of human actions, and sediment is a major determinant of channel shape (Leopold 1997). When the dynamic equilibrium has been disrupted, the channel begins a process of adjustment as it attempts to restore a dimension, pattern, and profile that are consistent with controlling hydraulic variables (Rosgen 1996). These adjustments may lead to dramatic changes in the stream channel width, depth, and geometry that encroach on human activities, such as has occurred on the Verde River. As human activities are affected, additional flood control and channelization measures may occur, which exacerbate the problems in adjacent areas, and the channel will continue to become increasingly unstable. May of these effects have been ameliorated, and several recovery projects are underway.

Flood control, channelization, and bank-stabilization efforts usually take one of several forms: dikes, rip-rap, soil-cement, Kellner jacks, or gabions parallel to the channel; check dams across the channel; removal of woody debris from the channel and floodplain; and rerouting the channel. More rudimentary forms of bank stabilization can be found when old vehicles or other large objects are found stacked along a river bank. Removing trees, logs, and other woody debris from stream channels is a common form of flood control practiced by landowners and is seldom documented. Woody debris is very important in stream function and fish habitat (Debano et al. 1995).

Fragmentation has also provided some benefits to native aquatic species. While they are no longer able to move into other areas, the same impediments also inhibit the movement of nonnative fish and other aquatic species. These nonnative species were imported by humans, starting with common carp (*Cyprinus carpio*) in 1885 (Gilbert and Scofield 1898). Since that time, at least 50 species of nonnative fish have been introduced (ASU, Geographic Information Systems database of fish records, 2001) into the Gila River basin, and there are other records of

incidental occurrences of another 10 to 15 species. Many nonnative aquatic invertebrates, amphibians, reptiles, plants, and disease organisms have also been introduced. These species have been purposefully introduced for sport-fishing, bait, biocontrol, and ornamental fish use and releases through aquaculture, aquarium, and generalized "bait bucket" activities. They have also been accidentally introduced through interbasin water transfers (Davies et al. 1992, Meador 1992, 1996; Stefferud and Meador 1998, Claudi and Leach 2000), aquarium and pet releases (Welcomme 1988, Courtenay 1993, FAO 1998), and inclusion with other species being purposefully stocked (Marsh and Minckley 1982, Platz et al. 1990). Nonnative aquatic species have had major detrimental impacts on native aquatic fauna and have been a major factor in the listing of topminnow and pupfish, as well as many other fishes native to the Gila basin (Desert Fishes Team 2003, 2006; USFWS 1984; 40 FR 29863, 50 FR 30188, 51 FR 10842, 51 FR 23769, 51 FR 39468, 52 FR 46400, 56 FR 13374). Introduction of nonnative pathogens, parasites (Wilson et al. 1996, Robinson et al. 1996, Weedman et al. 1996), plants, invertebrates, amphibians, and fish negatively affects the native fishes of the Southwest.

In summary, the quality and quantity of suitable aquatic habitat for threatened and endangered fish in the action area has been affected through numerous past actions resulting in reduction of riparian habitat, altered species composition, increased presence of nonindigenous aquatic species, decreased surface-water availability, changes in stream morphology, and other factors. A significant portion of the adverse impacts to the aquatic and riparian ecosystem come from the additive effect of small actions that individually may not threaten the system, but cumulatively result in continuing deterioration of the ecosystem.

Gila topminnow

The reestablishment history of Gila topminnow illustrates that even sites that were thought to be secure may fail for various reasons (Voeltz and Bettaso 2003). Many reestablished occupied sites have not demonstrated occupancy long enough, are not very large, and may lack the ability to survive the current, potentially long-term drought (McPhee et al. 2004).

Gila topminnow are widely dispersed, and in some cases vulnerable to stochastic events. These events would include invasions or unauthorized introductions of nonnative fishes, drought, and stochastic events such as floods and wildfire. Continued and periodic drought impacts Gila topminnow through the loss of potential aquatic sites and the potential loss of existing sites. The concentration of fish in smaller and smaller pools results in increased predation, reduced water quality, and higher rates of disease transmission. However, Gila topminnow are live bearers and highly fecund, so populations can rebound quickly, which is probably part of this species' life history strategy for dealing with periodic droughts that are common in the southwestern U.S. Other factors that could negatively impact Gila topminnow within the action area include: nonnative predators and competitors, disruption of metapopulation dynamics, poorly managed livestock grazing, degradation of water quality, degradation of cover vegetation, degraded watershed conditions, disease and parasite infestations, wildfires and fire-suppression activities, drought, global climate change, pesticide drift and run off, and groundwater pumping. The effects of increased illegal immigration and Border Patrol activities may have some impact on

these populations. The use of these sites for bathing and personal hygiene may result in some decrease in water quality, but effects of this type have not been studied.

Yaqui topminnow

The entire range of the species in Arizona is covered by the SHA. The historical range of the Yaqui fishes, including the Yaqui topminnow, includes the Rio Yaqui (= Black Draw and Whitewater Draw) basin and Sulphur Spring Valley (USFWS 1995). Impacts to and the environmental baseline of the Yaqui topminnow will be the same as for the Gila topminnow, but smaller in geographic scope.

Desert pupfish

The entire range of the species in Arizona is covered by the SHA. The desert pupfish within the action area, and the covered area, is known from five reestablished populations (Desert Fishes Team 2003). These sites are on BLM land and The Nature Conservancy land covered by a separate safe harbor agreement. Impacts to the desert pupfish baseline will be the same as for the Gila topminnow. Desert pupfish may be released in the entire Gila River basin, including the Santa Cruz River subbasin, and generally below 5000 feet.

Quitobaquito pupfish

The entire range of the species in Arizona is covered by the SHA. Designated critical habitat for Quitobaquito pupfish is located at Quitobaquito Spring, on Organ Pipe Cactus National Monument; therefore, it will not be affected by the SHA. Most of the range of the Quitobaquito pupfish in Arizona is on Federal land or on the Tohono O'Odham Nation. Therefore, use of the safe harbor for Quitobaquito pupfish will be limited to a very small geographic area and maybe for captive sites that would be used as refuges.

Yuma clapper rail

The Yuma clapper rail in the action area occurs mainly along the lower Colorado River in marshes from the border with Mexico to Havasu National Wildlife Refuge and along the lower Gila River in Yuma County, the Phoenix metropolitan area (including portions of the Gila, Salt and Verde rivers) in Maricopa County, and Picacho Reservoir in Pinal County (USFWS annual survey data). Actions that have undergone Section 7 consultations in the action area include issuance of Clean Water Act section 404 permits for dredging or filling in wetlands and placement of seawalls or other shoreline modifications on all rivers and streams within the U.S. range of the species. The number of such actions varies between river systems.

Actions by the Bureau of Reclamation in managing the lower Colorado River have the greatest potential to destroy large marsh habitats or disturb individual birds during dredging, bank stabilization, and other channel-maintenance activities. Past Federal actions to construct dams, diversion structures, and other management actions have increased the amount and longevity of

marsh habitats in several locations on the lower Colorado River. These same actions eliminate the variable physical conditions that provide for marsh regeneration, and habitat quality is reduced over time. Measures are in place under biological opinions issued for Reclamation's maintenance activities and the Lower Colorado River Multiple Species Conservation Plan to reduce or eliminate adverse effects of management on some remaining marshes. Changes to water releases in the lower Colorado River partly subject to Reclamation oversight and are also addressed for reduction of effects and replacement of lost habitat.

Chiricahua leopard frog

The action area includes the Arizona portion of the historical range of the Chiricahua leopard frog below the Mogollon Rim, on non-Federal lands within the covered area of the SHA. Many of the mountain ranges in southern Arizona no longer have a known occupied site or now only have a single site, including the Chiricahua, Santa Rita, Patagonia, Peloncillo, Galiuro, and Dragoon mountains. In the southern portion of the range, only one likely extant population occurs on non-Federal lands, which is covered by the Malpai Borderland Group's Safe Harbor Agreement. This does not include the seven populations of the closely related Ramsey Canyon leopard frogs, five of which are on private lands.

A statewide SHA was finished last year which seeks: to establish a program for the conservation of the Chiricahua leopard frog on private and other non-Federal lands in Arizona; to provide regulatory assurances to voluntary participants that their conservation efforts will not result in required or imposed additional conservation measures or additional land-, water-, or resource-use restrictions beyond those agreed to at the time of enrollment and in the original Agreement; and to provide similar assurances to landowners who do not participate directly in the conservation program established under this Agreement, but who may desire regulatory assurances due to their proximity to program participants or other lands harboring Chiricahua leopard frogs.

The strategy of the final recovery plan is that the frog must reach a population level and have sufficient habitat to provide for the long-term persistence of metapopulations in each of eight recovery units across the species' range. The strategy will involve reducing threats to existing populations; maintaining, restoring, and creating habitat that will be managed in the long-term; translocating frogs to establish, reestablish, or augment populations; building support for the recovery effort through outreach and education; monitoring; research to provide effective conservation and recovery; and application of research and monitoring through adaptive management. Management areas are identified in each recovery unit where we believe the potential for successful recovery actions is greatest (USFWS 2007).

The factors listed in the final recovery plan (USFWS 2007) as threats apply within the action area. These include: nonnative predators and competitors, disruption of metapopulation dynamics, poorly managed livestock grazing, degradation of water quality, degradation of cover vegetation, degraded watershed conditions, disease, wildfires and fire-suppression activities, drought, global climate change, pesticide drift and run off, and groundwater pumping. A complete discussion of the factors affecting Chiricahua leopard frogs in the action area is

included in the Programmatic Biological and Conference Opinion on the Continued Implementation of the Land and Resource Management Plans for the Eleven National Forests and National Grasslands of the Southwestern Region (AESO/SE 02-22-03-F-0366), the Statewide Safe Harbor Agreement (AGFD and USFWS 2006), and the final recovery plan (USFWS 2007).

Canelo Hills ladies' tresses

The entire range of this species is within the action area; thus, the status of the species in the action area is the same as described in the Status of Species section. Conservation of the species is considered and managed for at the two sites on The Nature Conservancy property and the Coronado National Forest. The three populations on private lands have very little protection under the Endangered Species Act or State law.

The populations of Canelo Hills Ladies' tresses in the action area are small and localized, making them vulnerable to stochastic environmental events such as drought, floods, and fire. Fires have become more common in recent years with the current drought cycle. Catastrophic fires can increase run-off and sedimentation, which bury plants and change the soil chemistry. Trampling impacts can occur from illegal immigrant camps near water sources, and Border Patrol activities may also result in localized loss of plants and habitat damage. The same type of impact can occur from recreation in these areas, but these impacts are typically smaller and more limited in time. Livestock grazing, if not managed properly, can impact ciénega plants like Canelo Hills Ladies' tresses, especially if grazing occurs during the growing season. Properly managed grazing and some fire can be beneficial to ladies' tresses, as they need periodic disturbance of their cienega habitats.

Gila chub

In the action area, small remnant populations remain in several tributaries of the upper Verde, San Pedro, San Carlos, Blue, San Francisco, and the Gila rivers. In the Verde River basin, Walker and Spring creek populations are considered stable-threatened, and the Red Tank Draw population is considered unstable-threatened. In the Santa Cruz River basin, Sheehy Spring has a population that is considered unstable-threatened, Ciénega Creek is considered stable-threatened, and Ciénega Creek tributaries Mattie Canyon and Empire Gulch are considered unstable-threatened populations. The Babocomari River population is considered unstable-threatened, as is the tributary population in O'Donnell Creek. Three populations in tributaries lower in the San Pedro River basin are considered stable-threatened; Redfield, Hot Springs, and Bass Canyon. Other populations may occur on the San Carlos River and the Blue River, but information is not available to us on their status. Two tributaries of the Gila River in Arizona have extant populations of Gila chub. Eagle Creek has an unstable-threatened population, and Bonita Creek has a stable-threatened population (Weedman et al. 1996 70 FR 66664). The Gila chub is affected by many of the same threats as the Gila topminnow.

Razorback sucker

The historical distribution of razorback sucker may have included the entire Gila basin in the action area, exclusive of the Santa Cruz River (Kirsch 1889, Hubbs and Miller 1953, Minckley 1973, Bestgen 1990). Even though several reestablishment efforts have been attempted over the years, these efforts seem to have been unsuccessful (USFWS 1998), with recaptures occurring only rarely in the Verde River.

Some report that the razorback sucker is likely to have been extirpated from the Gila River despite massive reestablishment efforts from 1981 to 1990 (R. Clarkson, P. Marsh, J. Stefferud, and S. Stefferud, pers. comm.). Small numbers of released razorback suckers may survive in the Gila River and Bonita and Eagle creeks. Fish may have also moved upstream into the San Francisco River. The BLM reported a large razorback sucker found in Bonita Creek in 1991. Fishes occurring at exceedingly low abundance are difficult to detect (Marsh et al. 2003). Given this uncertainty, there is a small possibility that razorback suckers may occur intermittently and in small numbers in the project area up the San Francisco River or Eagle Creek.

The razorback sucker was historically found in the Verde River at least as far upstream as Perkinsville (Minckley and Alger 1968). Due to habitat alterations and spread of non native species, razorback suckers were extirpated from the Verde River, with the last record at Peck's Lake in 1954 (Wagner 1954, Minckley 1973). Beginning in 1981 and continuing through the 1990s, razorback suckers have been reestablished into the upper Verde River. Predation from non-native species was believed to be a major cause of mortality from the initial stockings. This was later managed by placing larger fish, less susceptible to predation, in the river. Monitoring studies have shown that reestablished razorback suckers in the Verde River use pools, runs, and backwaters, with some use of eddies (Creef et. al 1992, Hendrickson 1993).

Designated critical habitat for razorback sucker in the action area includes portions of the Verde, Gila, and the Salt rivers. Along the Verde River, the action area includes designated critical habitat from about Camp Verde to about five miles downstream from the confluence with the East Verde River (Yavapai County). Along the Salt River, critical habitat within the action area is located downstream from the US Highway 60/State Route 77 bridge to about the confluence with Cherry Creek (Gila County). Critical habitat along the Gila River includes the river from New Mexico to Coolidge Dam including San Carlos Reservoir to its full-pool elevation.

Huachuca springsnail

The entire known range of the Huachuca springsnail is within the action area, except the two springs in Sonora, Mexico. Five springs are located on non-Federal land and are within the area covered by the SHA. The populations within the action area are subject to effects from all the threats discussed under the Status of the Species. The six populations on Fort Huachuca are by far the most secure, but are still subject to effects from altered fire regimes, drought, recreation, and catastrophic fire resulting from human-caused alterations of fire regimes. Populations on the Coronado National Forest are subjected to the additional effects of improper grazing, timber harvest, mining, and water developments, as well as those activities affecting populations on Fort

Huachuca. These populations on Federal land receive some protection from threats through continued land and resource management planning; topminnow and pupfish will not be released under the SHA into these areas. The populations within the covered area of the SHA are not subject to public planning processes and are subject to all of the threats listed above. In addition, because populations are isolated, once extirpated, sites are unlikely to be recolonized without active management.

Huachuca water umbel

The entire current range of Huachuca water umbel as described in the status of the species is included within the action area, except for that within Mexico. While most of the occupied Huachuca water umbel habitat is on federally owned lands and is, therefore, not within the covered area of the SHA, there may be impacts that occur downstream from covered properties, though it is not very likely. A few umbel sites in Arizona may be too high in elevation for topminnow or pupfish.

All the designated critical habitat units for Huachuca water umbel are within the action area: Unit 1: portion of Sonoita Creek (Santa Cruz County), Unit 2: portion of the upper Santa Cruz River (Santa Cruz County), Unit 3: portion of Scotia Canyon (Cochise County), Unit 4: portion of Sunnyside Canyon (Cochise County), Unit 5: portion of Garden Canyon (Cochise County), Unit 6: portions of Bear, an unnamed tributary of Bear Canyon, Lone Mountain Canyon, and Rattlesnake Canyon (Cochise County), and Unit 7: portions of the San Pedro River (Cochise County). Only critical habitat units 1, 2, and portions of 3, 6, and 7 include non-Federal lands and are within the covered area.

A suite of non-native plant species has invaded wetland communities in southern Arizona (Stromberg and Chew 1997), including those occupied by the Huachuca water umbel (Arizona Department of Water Resources 1994). In some cases, their effect on the Huachuca water umbel is unclear. On San Bernardino National Wildlife Refuge (SBNWR), reestablished Huachuca water umbel patches in managed wetland ponds were all quickly outcompeted and essentially eliminated by other wetland plants. Huachuca water umbel seems to do best along stream courses where flooding and scouring periodically remove competing vegetation while the Huachuca water umbel persists due to its rhizomes. Bermuda grass grows at SBNWR and out-competes Huachuca water umbel, but does not appear to be a problem at Leslie Canyon NWR. Watercress is another non-native plant now abundant along perennial streams in Arizona. Huachuca water umbel grows together with watercress at Leslie Canyon, but watercress does not appear to stress the Huachuca water umbel.

Sonora tiger salamander

The entire Arizona distribution of the Sonora tiger salamander is within the action area. The San Rafael Valley includes a mixture of private, State Trust, State Natural Area, and Federal lands. The Sonora tiger salamander co-exists with the Chiricahua leopard frog in this area, and likely coexisted with Gila topminnow and Gila chub, and possibly the desert pupfish.

Factors affecting the salamander in the action area are the same as those affecting the species throughout its range in the San Rafael Valley (described in the Status of the Species). These include predation by introduced species and disease; introduction, spread, and introgression of barred tiger salamanders; drought and floods; the dynamic nature of small populations; and habitat degradation and loss. Drought is of particular concern; tanks can dry before the monsoons begin in July.

Southwestern willow flycatcher

Southwestern willow flycatchers in the action area are known to breed along portions of the Verde River, portions of the Salt River, Tonto Creek, Cienega Creek, Gila River, Hassayampa River, and the San Pedro River in the San Pedro Riparian National Conservation Area. Historical breeding sites within the action area include Babocomari River and Sonoita Creek. A complete description of all monitored sites is available in the Arizona Game and Fish Department's Southwestern Willow Flycatcher 2005 Survey and Nesting Monitoring Report (English et al. 2006, available at http://www.usgs.nau.edu/swwf/reports.htm), the contents of which are incorporated by reference.

Migrant southwestern willow flycatcher habitat is not well understood, but has been recorded on major southwestern rivers. Migrant birds have been detected in riparian ecosystems both suitable and unsuitable for nesting and may occur in non-riparian areas. Such migration stopover areas are critically important resources affecting productivity and survival (USFWS 2002a).

Critical habitat for the southwestern willow flycatcher within the action area in Arizona includes portions of the Roosevelt management unit (MU) - the upper half of Tonto Creek and upstream tip of the Salt River at Cherry Creek sections; portions of the Verde River MU – a section of the upper segment along the Verde River south of Camp Verde and a section of the middle segment that includes few miles of the Verde River downstream of the East Verde River confluence; the middle Gila/San Pedro MU; and upper Gila MU. Non-Federal lands are found along many of these sections. These non-federally owned lands are within the covered area of the SHA.

Information regarding the status of southwestern willow flycatchers on non-Federal lands (including tribal lands) within the action area is not well documented, unless active nest monitoring is occurring or a Federal action has occurred in the area. It is assumed that threats to southwestern willow flycatchers are similar on non-Federal lands to those that occur on Federal lands, though the non-Federal activities are implemented without the protections and enhancements that can occur through section 7 consultation. Therefore, habitat disturbances from dams, reservoir operations, water diversions, ground water pumping, channelization, bank stabilization, phreatophyte control, improper livestock grazing, recreation, fire, agricultural development, urbanization, and nonnative species are as described in the recovery plan (USFWS 2002a).

Within the action area, section 7 consultations have been conducted on ongoing grazing activities (AESO/SE 02-21-04-F-0355), land use management plans (02-22-03-F-0366), bridges (AESO/SE 02-21-97-F-0229 R1 and 02-21-03-M-0207), fire management (AESO/SE 02-21-05-F-0582 and 02-21-03-F-0210), recovery and research activities (AESO/SE 02-21-05-F-0331), and reservoir operations (AESO/SE 02-02-04-F-0001 and 02-21-04-F-0077). May of these projects have reduced effects of these activities on the southwestern willow flycatcher and its habitat. In addition, several gains have been made in improving hydrological function of stream and river systems.

Western yellow-billed cuckoo

Western yellow-billed cuckoos are scattered throughout the central, east-central, west central, and southeastern parts of Arizona, with most known populations occurring along the San Pedro, Verde, and Agua Fria rivers and Ciénega Creek in Pima, Pinal, Cochise, and Yavapai counties, and Sonoita Creek in Santa Cruz County (Corman and Magill 2000). Surveys performed throughout Arizona by the AGFD and the U.S. Geological Survey Colorado Plateau Field Station allow cuckoo abundance to be extracted from major drainages occurring on National Forest System lands (USFS 2004:228). The surveys performed in 1998 and 1999 were conducted mostly on public lands, but some information was reported from private lands. Western yellow-billed cuckoos were most abundant in the Agua Fria, Verde, Hassayampa, and Altar Valley river systems (Corman and Magill 2000). Corman (2005) reported that western yellow-billed cuckoos were encountered by survey crews and individuals conducting breeding bird atlas surveys in central and southeastern Arizona perennial drainages below 1,524 m (5,000 ft) elevation. This would include the Verde, Salt, San Pedro, and Santa Cruz rivers. They are likely to be found in appropriate habitat within the action area, including in the SHA's covered area.

Loss of riparian habitat occurring through river-flow management, stream channelization and stabilization, and improper livestock grazing is the primary threat to the cuckoo. Other activities that directly affect riparian areas are water diversions and withdrawals, recreation, fuels reduction, and enhancements of habitat and watershed condition. Due to the invasion of riparian habitats by nonnative plant species, the southwest is experiencing considerable changes to the dynamics of its riparian ecosystems. Therefore, invasive plants have direct effects on cuckoo habitat. Human-induced destruction of available cuckoo habitat occurring in the action area remains prevalent, with recreational activities directly affecting riparian conditions. Off-highway vehicle use can destroy riparian habitats, and can degrade watershed condition in upland habitats.

Headwater chub

Habitat occupied by the headwater chub within the action area includes Fossil Creek, the East Verde River, Tonto Creek, and the following tributaries to Tonto Creek: Buzzard Roost, Gordon, Gun, Haigler, Marsh, Rock, and Spring creeks. Reaches of these creeks below about 5000' feet are suitable or potential habitat for plan species, and so are considered part of the action area. The species is considered extirpated from Horton Creek, which is a tributary of Tonto Creek. The status of the species in the other occupied reaches is: stable – Buzzard Roost, Gordon, Haigler, Marsh, Rock, and Spring creeks; and unstable/threatened – Gun, Fossil, and

Tonto creeks, and East Verde River. The species is also known historically from Ash Creek; however, the status of the species there is unknown. Non-Federal lands within these occupied reaches are within the covered area.

At certain locations, activities such as groundwater pumping, surface water diversions, impoundments, dams, channelization (straightening of the natural watercourse, typically for flood control purposes), improperly managed livestock grazing, wildfire, agriculture, mining, roads, logging, residential development, and recreation all contribute to riparian and ciénega habitat loss and degradation in Arizona (Minckley and Deacon 1991, Tellman et al. 1997, Propst 1999, Voeltz 2002). Some recovery planning is underway.

EFFECTS OF THE PROPOSED ACTION

"Effects of the action" refer to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action (50 CFR §402.02). "Interrelated actions" are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration (50 CFR §402.02).

The entire ranges of the four covered species in Arizona are covered by the SHA. Federal lands are not included. Impacts from implementation of the Safe Harbor Agreement and associated permit will be similar for all four species. The discussion of effects for all four species is discussed below. Species-specific effects will be discussed in the appropriate section following this general discussion.

Issuance of a Section 10(a)(1)(A) enhancement of survival permit will contribute to the conservation and recovery of the Gila topminnow, Quitobaquito pupfish, Yaqui topminnow, and desert pupfish. The overall effect of the proposed action should be beneficial, as the SHA is designed to provide a net conservation benefit for both species. The proposed action will provide refuge populations, may provide level 3 populations of topminnow and pupfish (USFWS 1993, Weedman 1998), and can also serve as a source of fish for reestablishment efforts. The sites can also provide for research and education. The proposed action partially implements step-down objectives 1.1, 2.1, 2.2, 2.4, 2.6, 5, and 6 of the Draft Revised Gila topminnow Recovery Plan (Weedman 1998); 2.5, 2.6, 5.1, 5.3, 5.4, 6.1, 6.2, 6.3 of the Yaqui Fishes Recovery Plan (USFWS 1995); and 2, 5, and 7 of the Desert Pupfish Recovery Plan (USFWS 1993).

Because the SHA and each Certificate of Inclusion may allow certain actions to occur, there could be negative impacts to multiple species and their habitat. Other actions taken by AGFD to manage the site could also negatively impact the four species. The following activities are among those that may result in taking of listed species:

- Aquatic site maintenance;

- Actions to remove nonnative aquatic species;

- Vegetation management;
- Any normal day-to-day land use and management activity as agreed to by the Department and the Cooperator; and
- Returning the site to baseline conditions.

In addition to the activities listed above, extenuating factors beyond the landowner's control could result in loss of topminnows and pupfish. Examples of extenuating factors include, but are not limited to:

- Invasion and predation by native or nonnative species;
- Desiccation as a result of drought or flooding;
- Water-quality fluctuations resulting from natural causes or outside sources; and
- Immediate responses to emergencies.

The potential changes in land-management practices that are part of the proposed action are to improve native fish habitat quality and complexity. Changes in livestock management are not required under the SHA, but may include such actions as reducing the number of livestock or the number of days they would be present in an occupied site. It is anticipated that there may still be some disturbance of fish and crushing of eggs by livestock accessing occupied sites, and siltation from eroding uplands.

Livestock management on non-Federal lands is highly varied, ranging from allowing livestock to roam within the ranch to highly regimented rotational grazing plans. The Natural Resource Conservation Service (NRCS) assists ranchers in developing custom ranch-management plans, but implementation is at the discretion of the operator. Livestock grazing can result in reduction of vegetation in the uplands to the point that erosion of topsoil and sedimentation increases in aquatic sites. This can result in decreased water quality and loss of habitat. Livestock use of occupied sites can potentially result in a small number of dead and injured individuals from trampling as livestock move.

The construction activities that are proposed as part of the SHA are those that would either improve habitat quality and persistence, or reduce direct effects of other land uses on the species. Construction of new livestock tanks, water wells, and pipelines typically do not occur within existing habitat, so any negative effects are expected to be minimal. Construction of fences, pipelines, and modification to or maintenance of existing tanks on enrolled sites could result in impacts to the plan species (if present) from crushing individuals under heavy equipment, inadvertent burying of individuals while moving soil, and increased siltation in aquatic sites. However, long-term effects of these activities are anticipated to be beneficial by improving the number, quality, and persistence of aquatic sites. The long-term beneficial effects should out-weigh the short-term negative effects.

Nonnative predators and competitors will continue to exclude topminnow and pupfish, as well as many other native species, from otherwise suitable aquatic sites. The process of removing these nonnative species can result in short-term unavailability of aquatic sites for use by topminnow and pupfish through draining or the use of approved piscicides. These activities are usually done during the drier part of the year. Pupfish and topminnow occupying a site to be renovated will be salvaged under this SHA and reestablished into the same site once the site is suitable. These renovations, however, may result in the direct mortality of eggs and adult fish that may be missed in the salvage effort and incidentally killed in the renovation process. However, the long-term effects of these actions will be to make these sites available for reestablishment of topminnow and pupfish, and would be beneficial to the species.

The reestablishment of the covered species may indirectly result in mortality from native predators feeding on topminnow and pupfish at the reestablishment site. Native fish or frogs that may prey on or compete with topminnow and pupfish may already be present at enrolled sites, or released there later. While such predation may result in the loss of individuals, the effect of these sources of mortality and morbidity are well within the population dynamics of the covered species. The life history of these native fish is characterized by high reproductive output and high rates of egg and juvenile mortality. Therefore, normal population dynamics would include these types of mortality and would typically replace lost individuals quickly. The long-term impacts of these losses would be negligible on the population site. A cooperator is not allowed to release nonnative fish, amphibians, or invertebrates under a Certificate of Inclusion.

The SHA provides for cooperators to return enrolled properties to baseline condition. This provision has the potential to impact all reestablished population sites and any habitat created through the SHA. It will not affect those population sites or habitats that are developed during the term of the SHA on Federal lands or non-Federal lands that are not enrolled under the SHA. Furthermore, any population site or habitat that is part of the baseline condition of an enrolled property will not be affected, including properties with an agreed-to elevated baseline. In addition, it is expected that not all landowners enrolled in the SHA will return their property to the baseline condition.

The SHA provides for the salvage of fish from all sites being returned to baseline condition, so while individuals will be lost, not all gains from the conservation activities will be lost with the return to baseline. It is anticipated that many enrolled sites will be renewed indefinitely throughout the 50-year duration of the permit, and the permit is likely to be renewed as well. However, potentially all sites that are enhanced or have fish established through the SHA may be lost as the landowner assurances are exercised. Topminnow and pupfish from sites that will be returned to baseline can be salvaged and translocated to new or existing sites. In summary, the execution of this SHA will benefit the species.

Topminnow and pupfish

The loss of individuals, or even entire populations, of topminnow and pupfish at enrolled sites is expected to occur during the term of the permit and SHA. No impact on natural or reestablished

populations outside enrolled sites is expected from actions taken under the permit. Topminnow and pupfish will be removed when possible from enrolled sites before known management actions occur that might cause their extirpation. Populations at enrolled sites can be reestablished as necessary and feasible. Fish stocked at most enrolled sites are considered surplus and therefore not crucial to recovery populations, so loss of the populations would have little significant negative impact on the overall recovery of either species.

Topminnow and pupfish may be taken from existing natural, reestablished, or captive sites in support of all stocking programs, including the SHA. Removal and transfer of fish is covered by the Department's or Service's 10(a)(1)(A) Scientific Collection Permit. Restrictions in the permits will protect the integrity of source populations in the context of both species' recovery programs. In addition, both topminnow and pupfish are highly fecund, and fish removed from a population are highly likely to be replaced within a matter of months or even weeks.

Management actions by the cooperator, Department, or Service that may occur at each enrolled site may cause short-term, negative, on-site impacts. Those which may occur are anticipated to be minimized and mitigated by complete SHA implementation. The demand and interest for native fish, and specifically for native fish that can control mosquitos, has grown greatly over the last five years. Thus, there should be no shortage of sites that enroll in the SHA. We expect that demand for fish will outpace the supply in the beginning stages of safe harbor implementation. Desert pupfish critical habitat will not be affected by the SHA because it is only on Federal land.

Yuma clapper rail

Rails are more likely to be found in vegetation patches larger than 0.5 acre, in a functioning marsh with other marsh birds present, and in appropriate vegetation that is more than 10 ft wide. Any action that could affect cattail or bulrush vegetation may adversely affect clapper rails. These actions could cause temporary or permanent loss of clapper rail habitat. If clapper rails are present when actions occur, individuals may be disturbed or killed, and nests or chicks could be abandoned. Also, the use of piscicides may affect the prey base for clapper rails. Other actions that could impact Yuma clapper rails may need additional compliance under the Act, either through a section 7 consultation if there is a Federal nexus or through additional section 10 compliance. If there is no possibility that there will be take, no additional compliance may be needed.

Chiricahua leopard frog

The following actions could affect leopard frogs if they are present at a site:

- Intentional drying of the habitat;
- Earthwork around occupied habitats;
- Vegetation management; and
- Water diversion and management.

These actions could affect adult and juvenile frogs, eggs, and leopard frog habitat. Artificial waters in urban, suburban, or exurban settings are unlikely to have leopard frogs. It is possible that wild sites, even artificial ones like stock waters, could have Chiricahua leopard frogs, though many wild sites are infested with bullfrogs, which exclude leopard frogs. Much of the range of the Chiricahua leopard frog is above the elevation range of the covered species. Many of the Chiricahua leopard frog sites are known, though many waters within the species' range have not been surveyed, and the species is mobile. Therefore, it is possible that a site enrolled in the SHA could contain a leopard frog population. If the only action to be taken at the site is the release of topminnow or pupfish, impacts to leopard frogs are expected to be minimal or nonexistent. If actions such as vegetation management or pond maintenance are done under the SHA, negative impacts to leopard frogs could occur. Sites within the range of the leopard frog that have such actions scheduled as part of the SHA need to have leopard frog surveys done before the action occurs. If Chiricahua leopard frogs are found, incidental take of Chiricahua leopard frogs is authorized under this BO, or the action may be changed so that no incidental take occurs, cancelled, or additional Endangered Species Act compliance may be necessary. Livestock use of or maintenance activities at livestock tanks are already covered by the special 4(d) rule. These activities include the use of tanks by livestock, occasional dredging of tanks, repair of berms, and other maintenance, and are consistent with the effects of management and construction, respectively. Also, the Chiricahua leopard frog is covered under another AGFD SHA. A landowner could sign up for both agreements, and would then be covered for the leopard frog, though a baseline survey for the frog would also need to be done. If the landowner enrolls in the frog SHA, any and all take of frogs above the baseline would be covered under that permit and Biological Opinion. Requirements for the Chiricahua leopard frog will be included as a stipulation of the 10(a)(1)(A) permit applied for under this action.

Canelo Hills ladies' tresses

Livestock grazing, if not managed properly, can impact ciénega plants like Canelo Hills ladies' tresses, especially if grazing occurs during the growing season. However, maintenance of viable populations is expected to be compatible with well-managed grazing. Grazing is an activity that will take place under the SHA. Some trampling of Canelo Hills ladies' tresses is possible as crews move through riparian areas within the range of this species during these activities. However, long-term effects should be small to non-existent.

Gila chub

It is unlikely that any impacts to the Gila chub will occur under the SHA. Gila chub are very restricted in their distribution, and because almost all Gila chub populations are in stream systems, it is highly unlikely that the covered species would be released there, since the SHA has restrictions on the use of sites that have the potential to connect to other waters. Many of the populations are also on Federal lands. The addition of topminnow or pupfish would likely benefit Gila chub, as chub are piscivorous and would readily prey on both topminnow and pupfish, but this would still benefit topminnow and pupfish. Surveys taken to determine the

baseline conditions for topminnow and pupfish of potential SHA sites would likely document the presence of Gila chub.

Non-Federal parcels of critical habitat located within the action area could be affected by activities implementing the SHA, including modifications to land-management activities, control of nonnative species, and reestablishment of topminnow or pupfish populations, which may result in some short-term adverse effects to Gila chub critical habitat. Changes in land-use practices through the SHA are expected to improve hydrological function of enrolled aquatic systems. While this will not eliminate existing adverse effects to primary consistent elements on non-Federal land, it should benefit Gila chub habitat by improving conditions in upland and riparian vegetation, improving hydrological function, and reducing adverse effects on aquatic ecosystems.

The control or removal of nonnative species could result in temporary adverse effects to several constituent elements of designated Gila chub critical habitat. The use of piscicides would temporarily result in adverse effects to water quality and reduce the food base. Because some nonnative species prey on or compete with Gila chub, the removal of nonnative species could be beneficial to Gila chub. In addition, the long-term effects of these activities would be to manage or eliminate the nonnative species within critical habitat for Gila chub, enhancing one of the primary constituent elements.

The reestablishment of topminnow or pupfish within critical habitat units is not expected to affect any of the primary constituent elements of Gila chub critical habitat. The only exception is that Gila chub may prey on the eggs, young, and adult topminnow and pupfish, which would restore the natural predator/prey relationship of these species.

Returning a site to baseline condition could result in some of the same short-term effects to primary constituent elements as the control of nonnative predators and competitors discussed above. It may also result in a long-term loss of any improvements to primary constituent elements of Gila chub critical habitat that have resulted from SHA-related activities. This could occur from removal or stopping beneficial management activities, improving ranch infrastructure, and future control of nonnative predators and competitors of topminnow and pupfish that occurred during SHA participation. This should only affect improvements to primary constituent elements related to SHA participation and not degrade the condition of primary constituent elements of Gila chub critical habitat existing at the time of enrollment.

Overall, the SHA activities that may occur within critical habitat for the Gila chub are not likely to result in adverse effects to the conditions of any primary constituent elements present at the time of enrollment, except on a short-term basis, and they are anticipated to result in either short-term or long-term improvement of any affected constituent elements, depending on whether or when areas are returned to their baseline conditions.

Razorback sucker

It is highly unlikely that topminnow or pupfish released under the proposed SHA will occur in the mainstem habitats where razorback sucker may occur presently or in the future. As part of the recovery program for razorback sucker, they are periodically put in ponds that could also be used under the SHA. Razorbacks in these ponds are usually covered by Section 10(a)(1)(A) Scientific Collection Permits. Proposed actions under the SHA could affect habitat for razorback suckers in these ponds. Since razorback suckers are planktivorous, and topminnow and pupfish eat very small food items, it is highly unlikely that any of the species would prey on the others except in very rare instances. Designated critical habitat for the razorback sucker is unlikely to be affected because all designated critical habitat is in stream systems. The SHA cannot be used on sites that have the potential for fish to move from them unless downstream landowners also sign a Certificate of Inclusion.

Huachuca springsnail

Little is known of the ecology of the springsnail, or how it may be affected by native fishes. It is possible that topminnow or pupfish might prey on very small snails, but it is highly unlikely. Topminnow or pupfish released into a fishless system that contains Huachuca springsnails could change the ecology of the system to the point where springsnails could be indirectly affected. Springsnails are detritivores; a resource which is not typically limiting in aquatic ecosystems inhabited by springsnails, and a minor food item of topminnow and pupfish. Therefore, impacts are expected to result in loss of individual snails, but not significantly impact long-term conservation of the Huachuca springsnail.

Huachuca water umbel

Because most known water umbel sites on non-Federal lands are in streams, it is very unlikely that those sites will be used under the SHA. However, it is possible that unknown Huachuca water umbel sites may be used for the SHA program. The release of the covered species should have no direct effects on Huachuca water umbel. The SHA does allow other activities to occur, such as site maintenance and vegetation maintenance, that could adversely affect Huachuca water umbel. But as was discussed previously, Huachuca water umbel does not do well in most pond or low-disturbance habitats that are likely to be the bulk of the sites enrolled is the SHA. This means the chance of umbel occurring on enrolled sites is small, and if they do, some disturbances may actually benefit the umbel populations at that site.

Surveys before vegetation-management or surface-disturbing activities occur would be completed to identify locations of water umbel at SHA sites, for potentially minimizing impacts. Critical habitat could be negatively affected by management actions taken under the SHA. However, because many actions allowed under the SHA are designed to maintain aquatic habitat, which is one of the constituent elements for the umbel, impacts to critical habitat are expected to be temporary.

Sonora tiger salamander

Sonora tiger salamander status in the action area includes the entire Arizona distribution of the subspecies. The San Rafael Valley includes a mixture of private, State Trust, State Natural Area, and Federal lands. The Sonora tiger salamander co-exists with the Chiricahua leopard frog in this area, and likely coexisted with Gila topminnow and Gila chub, and possibly the desert pupfish.

Factors affecting the salamander in the action area are the same as those affecting the species throughout its range in the San Rafael Valley (described in the Status of the Species). Many of the known salamander populations are on private lands. Effects to tiger salamanders from actions taken under the SHA will be similar to those described above for the Chiricahua leopard frog.

Southwestern willow flycatcher

There should be no interactions between the covered species and the southwestern willow flycatcher, but it is possible that actions taken under the SHA could affect flycatchers. Any vegetation management is likely to focus on herbaceous plants, and not on riparian trees that flycatchers might use. Surface-disturbing actions could disturb migrating flycatchers. Because almost all sites enrolled under the SHA will be small, it is extremely unlikely the sites will contain habitat that is suitable for southwestern willow flycatcher breeding and nesting. However, because of the wide geographic coverage and the potential variability in the type of sites enrolled, we cannot dismiss the possibility that southwestern willow flycatchers could occur at a site with the resulting activities affecting feeding or sheltering activities. Designated critical habitat for the southwestern willow flycatcher is unlikely to be affected because all designated critical habitat is in stream systems. The SHA cannot be used on sites that have the potential for fish to move from them unless downstream landowners also sign a Certificate of Inclusion.

Western yellow-billed cuckoo

Impacts to the yellow-billed cuckoo from implementation of the SHA should be similar to those described above for the southwestern willow flycatcher. Cuckoos could occur almost anywhere in the covered area. Like flycatchers, western yellow-billed cuckoos prefer large blocks of riparian habitat near water for nesting. This type of habitat will rarely be enrolled under the SHA. It is possible, however, that dispersing or migrating yellow-billed cuckoos could use enrolled sites, and be subject to the same effects as those described for the southwestern willow flycatcher.

Headwater chub

Impacts from implementation of the SHA to headwater chub will be similar to those described for the Gila chub. Most headwater chub locations are in streams or on Federal lands and,

therefore, will not be used or are unlikely to have the covered species released there under the SHA.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation under section 7 of the Act.

The lands within the action area are primarily Federal and non-Federal ranchland. During the 50 years of this permit, the land-use patterns on non-Federal lands within the action area are likely to change significantly, as more open land is used more intensively. Activities related to grazing livestock and range management would include the presence of livestock on the range, use of aquatic sites as water holes, use of forage in upland sites surrounding aquatic sites, maintenance of stock tanks, and land treatments (herbicide treatment and prescribed fire). Livestock grazing results in variable removal of ground cover. During periods of drought and in areas where grazing management is slow in reacting to deteriorating range conditions, increased erosion may result in increased sedimentation into stock tanks and other aquatic habitats. This could result in an increase in the frequency of maintenance activities in stock tanks. Land treatments to maintain or restore rangelands include the use of herbicides and prescribed fire to reduce shrubs and increase perennial grasses.

Many of these land treatments may be consulted on through cooperative efforts with NRCS; however, small treatments could occur without a Federal nexus. Aquatic sites are not likely to be impacted directly, but may be inadvertently affected by run off of sediment, ash, or herbicide. The addition of sediment and ash could bury eggs and reduce habitat. While these effects are substantial, the area covered by land treatments, without a Federal nexus, is likely to be small and infrequent. In addition, any Participating Landowner in the SHA would be required to notify and allow salvage of fish before any land treatment. This further limits the impact of these activities within the action area.

The transportation system through the action area includes a combination of major highways, minor arterials, and unimproved rural roads. All of these roads will require periodic maintenance during the duration of the permit. It is also reasonable to assume that many of the roads that connect urbanized areas to each other or to recreational opportunities will be improved and widened in the next 50 years. These activities could potentially increase traffic speeds, allow for increased traffic, and potentially impact sites near improved roads. It could further increase visitation to occupied sites, resulting in impacts from illegal collection and illegal stocking of nonnative species.

Development of private lands and the conversion of rural land uses to urban land use continues across the action area. It is no longer only concentrated near the metropolitan areas, but in areas such as Rio Rico, Patagonia, Sonoita, Sierra Vista, Portal, Willcox, Safford, and Camp Verde.

Impacts of urban development will likely include increased traffic on roads, more recreational visitation to State and Federal lands within the action area, and increased use of ground water.

Human population centers are also centers for the introduction and spread of nonnative aquatic species. New nonnative species are certain to be introduced in this area, and nonnative species already present in the area will continue to be introduced into new areas. These actions are likely to continue to impact wild aquatic ecosystems and extant or potential pupfish and topminnow sites.

Aquatic sites on non-Federal lands that are not enrolled are likely to have mosquitofish or other nonnative species released into them because of the emphasis on and concerns regarding mosquito control that the arrival of West Nile virus in Arizona has created. The trend in the southwestern United States towards increasing aridity and increasing human populations is likely to continue to reduce the amount of natural aquatic habitat available for topminnow and pupfish through increased surface and groundwater development. This will make artificial habitats important for education and species conservation. The increasing human population in Arizona in the range of the four species is likely to require an increase the number of artificial habitats.

SUMMARY

Most of the project areas have been highly modified and may include entirely human-made habitats. The sites to be used for reestablishment of topminnow and pupfish will be within watersheds that they occupy or formerly occupied. The proposed action will provide a net conservation benefit to the desert pupfish, Gila topminnow, Quitobaquito pupfish, and Yaqui topminnow, though there will be short-term effects to some individuals and habitat on some enrolled properties. Only small, short-term adverse effects are expected to Yuma clapper rail, Chiricahua leopard frog, Canelo Hills ladies' tresses, Gila chub, Huachuca water umbel, Sonora tiger salamander, headwater chub, razorback sucker, Huachuca springsnail, southwestern willow flycatcher, and yellow-billed cuckoo.

CONCLUSION

We have completed a review of the permit application, SHA, and procedures for mitigating the permitted incidental take. After reviewing the status of the Gila topminnow, Quitobaquito pupfish, Yaqui topminnow, desert pupfish, Yuma clapper rail, Chiricahua leopard frog, Canelo Hills ladies' tresses, Gila chub, razorback sucker, Huachuca springsnail, Huachuca water umbel, Sonora tiger salamander, southwestern willow flycatcher, yellow-billed cuckoo, and the headwater chub; the environmental baseline for the action area; the effects of the proposed action; and the cumulative effects, it is our biological opinion that the issuance of a Enhancement of Survival Permit for incidental take, as proposed, is not likely to jeopardize the continued existence of these species. Effects to designated critical habitat for the Huachuca water umbel, razorback sucker, southwestern willow flycatcher, and Gila chub are expected to be minimal. Therefore, no critical habitat will be adversely modified or destroyed.

We base our conclusions on the following:

1. The issuance of the Enhancement of Survival permit and implementation of the SHA will have a net conservation benefit on Gila topminnow, Yaqui topminnow, Quitobaquito pupfish, and desert pupfish on enrolled properties.

2. The SHA will assist recovery of these species by: creating replicate populations; creating partnerships between state, Federal, and other groups; minimizing stocking of mosquitofish and other nonindigenous species; and educating those outside the native fish community about the plight of Arizona's native fishes.

3. Existing populations of topminnow and pupfish will not be affected. Any fish removed from an existing site will be replaced quickly due to the high reproductive rates of the covered species.

4. Cooperators will manage enrolled aquatic habitats consistent with the SHA.

5. If a Cooperator's actions may lead to the loss of individual topminnow and pupfish or the entire site, the cooperator must notify the Department so that fish may be salvaged if desired.

6. The potential effects to other species from implementation of the permit and SHA is expected to be minimal. Listed species that use riparian and aquatic habitats may benefit from the protection and management afforded to enrolled sites.

7. Effects to designated critical are unlikely to occur, and if they do, they are expected to be minimal and temporary, and critical habitat may actually be enhanced at least during the life of the permit.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act, prohibit take of endangered or threatened species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. "Harm" is defined (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined (50 CFR 17.3) as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. "Incidental" take is defined as take that is incidental to, and not the purpose of, the carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the proposed action is not considered to be prohibited taking under the Act provided such taking is in compliance with this Incidental Take Statement.

The proposed Department SHA clearly identifies the conservation measures that will be implemented to provide a net conservation benefit to topminnow and pupfish by contributing to their conservation and recovery. The proposed SHA also clearly identifies the anticipated impacts to these species likely to result from the proposed taking, as a result of implementing covered activities, and extenuating circumstances, and returning a site to the agreed-upon baseline conditions. All conservation measures described in the proposed SHA and any section 10(a)(1)(A) permit issued with respect to the proposed SHA are incorporated by reference as reasonable and prudent measures and terms and conditions within the Incidental Take Statement pursuant to 50 CFR §402.14(i). Such terms and conditions are non-discretionary and must be undertaken by the Service so that they become binding conditions of any grant or permit issued to the Department, as appropriate, for the exemptions under section 10(a)(1)(A) and section 7(o)(2) of the Act to apply. If the permittee and cooperators fail to adhere to these terms and conditions, the protective coverage of the section 10(a)(1)(A) permit and section 7(o)(2) may lapse. The Service has a continuing duty to regulate the activities covered by this incidental take statement. If the Service (1) fails to assume and implement the terms and conditions or (2) fails to require the Department to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the Department must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)]. The amount or extent of incidental take anticipated under the proposed Department SHA, associated reporting requirements, and provisions for disposition of dead or injured animals are as described in the SHA and its accompanying section 10(a)(1)(A) permit.

AMOUNT OR EXTENT OF TAKE

Based on the proposed Department SHA and on the analysis of the effects of the proposed action provided above, we anticipate that take of Quitobaquito pupfish, Gila topminnow, Yaqui topminnow, and desert pupfish may occur as a result of the following proposed covered actions:

1. Contamination of water due to run-off from roadways, agricultural fields, etc.;

2. Contamination of water during pesticide application;

3. Intentional drying of the habitat;

4. Earthwork around occupied habitats;

5. Management actions to remove nonnative aquatic species;

6. Vegetation management (including prescribed fire);

7. Water diversion and management;

8. Returning the site to the baseline condition; and

9. Any normal day-to-day land use and management activity as agreed to by the Department and Cooperators.

The proposed covered activities listed above could result in complete (100%) loss of the species at SHA sites. The SHA allows the Department and cooperators to bring populations of Yaqui topminnow, Quitobaquito pupfish, Gila topminnow, and desert pupfish back to baseline condition. Therefore, all sites and all individuals established under the SHA may be taken, if the baseline condition is zero.

Therefore, the level of take anticipated for topminnow and pupfish is:

- Up to all individuals in all sites established under the SHA that are above the baseline condition through implementation of proposed covered activities, including conservation activities, ongoing and pre-existing land-use activities, and land treatment activities as listed above; and

- All topminnow and pupfish, above baseline condition, at enrolled sites that are returned to baseline condition.

The incidental take statements provided for the Huachuca springsnail, yellow-billed cuckoo, and headwater chub do not become effective until the species are listed and the conference opinion is adopted as the biological opinion issued through formal consultation. At that time, the project will be reviewed to determine whether any take of the Huachuca springsnail, yellow-billed cuckoo, and headwater chub has occurred. Modifications of the opinion and incidental take statement may be appropriate to reflect that take. No take of the Huachuca springsnail, yellow-billed cuckoo, and headwater chub may occur between the listing and the adoption of the conference opinion through formal consultation, or the completion of a subsequent formal consultation.

We anticipate that the proposed action may also result in incidental take of Yuma clapper rail, Chiricahua leopard frog, Gila chub, razorback sucker, Huachuca springsnail, Sonora tiger salamander, southwestern willow flycatcher, yellow-billed cuckoo, and headwater chub if they are established at an enrolled site. Incidental take will be difficult to detect for the following reasons: dead animals are difficult to find, cause of death may be difficult to determine, and losses may be masked by seasonal fluctuations in numbers or other causes. An additional confounding factor in determining the amount of take is that the SHA is programmatic and is likely to cover a wide variety of sites and a wide geographic area. We anticipate the level of take based on the likely number of sites, their locations, habitat types, and the likelihood that the species below will be at a site. We anticipate that the following take could occur as a result of implementation of the proposed covered actions:

1. Harassment, harm, mortality, or injury of up to 5 Yuma clapper rails and their eggs, hatchlings, and fledglings annually for the entire SHA area;

2. Harassment, harm, mortality, or injury of up to 50 Chiricahua leopard frogs and their eggs, tadpoles, and metamorphs annually for the entire SHA area;

3. Harassment, harm, mortality, or injury of up to 100 Gila chub and their eggs and fry annually for the entire SHA area;

4. Harassment, harm, mortality, or injury of up to 100 razorback sucker and their eggs and fry annually for the entire SHA area;

5. Harassment, harm, mortality, or injury of up to 500 Huachuca springsnail and their eggs annually for the entire SHA area;

6. Harassment, harm, mortality, or injury of up to 15 Sonora tiger salamanders and their eggs, larvae, and metamorphs annually for the entire SHA area;

7. Harassment of up to 5 Southwestern willow flycatcher annually for the entire SHA area;

8. Harassment of up to 5 yellow-billed cuckoo annually for the entire SHA area; and

9. Harassment, harm, mortality, or injury of up to 10 headwater chub annually for the entire SHA area.

The Service will not refer the incidental take of any migratory bird for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712) if such take is in compliance with the terms and conditions (including amount or number) specified here.

EFFECT OF THE TAKE

In the accompanying biological opinion, we determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURES AND TERMS AND CONDITIONS

We believe the following reasonable and prudent measures are necessary and appropriate to minimize take. To be exempt from the prohibitions of Section 9 of the Act, we must comply with them and their terms and conditions, which implement the reasonable and prudent measures and outline required reporting and monitoring requirements. These terms and conditions are nondiscretionary.

1. Information obtained from pertinent monitoring operations will be reported and made available. Reports will include information from biological and compliance monitoring, incidental take, and all other actions undertaken to implement the SHA. Reports will be completed annually for the term of the permit.

2. Insure that the Yuma clapper rail, Chiricahua leopard frog, Gila chub, razorback sucker, Huachuca springsnail, southwestern willow flycatcher, headwater chub, yellow-billed cuckoo, and Sonora tiger salamander are adequately protected under the SHA.

2.1. Determinations on which species to survey for will be established for each site. If suitable habitats are present on a participant's property, surveys for Yuma clapper rail, Chiricahua leopard frog, Gila chub, razorback sucker, Huachuca springsnail, southwestern willow flycatcher, headwater chub, yellow-billed cuckoo, and Sonora tiger salamander should be done when the baseline determination for topminnow and pupfish is done. If suitable habitats for these species are not present, surveys are not required. If required surveys are not completed when baseline determination for topminnow and pupfish is done, surveys must be done before actions that could lead to take of those species. These determinations and the survey results will be documented in each Certificate of Inclusion. If additional Endangered Species Act compliance covers impacts to these nine species, surveys may not need to be done.

CONSERVATION RECOMMENDATIONS

Sections 2(c)(1) and 7(a)(1) of the Act direct Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. The Department and Service should work with vector control agencies and other groups to discourage the use of mosquitofish for mosquito control (Fishes of the Rio Yaqui Recovery Plan: Task 2.6 (USFWS 1995); Draft Revised Gila topminnow Recovery Plan (Weedman 1998: 1.4, 1.5, 2.4, 2.5).

REINITIATION - CLOSING STATEMENT

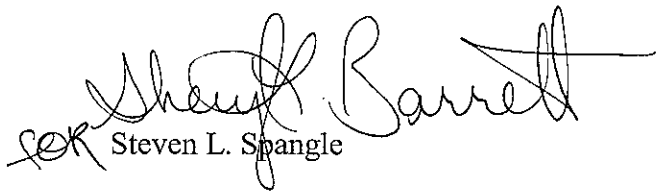
This concludes formal consultation on the proposed issuance of a section 10(a)(1)(A) permit to allow incidental take of Gila topminnow, Yaqui topminnow, Quitobaquito pupfish, and desert pupfish as a result of implementing the SHA, and its effects on those species and Yuma clapper rail, Chiricahua leopard frog, Canelo Hills ladies' tresses, Gila chub, razorback sucker, Huachuca springsnail, Huachuca water umbel, Sonora tiger salamander, southwestern willow flycatcher, yellow-billed cuckoo, and headwater chub as a result of management activities on enrolled lands. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is later modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by

the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

We may confirm the conference opinion as a biological opinion issued through formal consultation if the Huachuca springsnail, yellow-billed cuckoo, and headwater chub are listed. The request must be in writing. If we review the proposed action and find that there have been no significant changes in the action as planned or in the information used during the conference, we will confirm the conference opinion as the biological opinion on the project and no further section 7 consultation will be necessary.

The incidental take statements provided for the Huachuca springsnail, yellow-billed cuckoo, and headwater chub do not become effective until the species are listed and the conference opinion is adopted as the biological opinion issued through formal consultation. At that time, the project will be reviewed to determine whether any take of the Huachuca springsnail, yellow-billed cuckoo, and headwater chub has occurred. Modifications of the opinion and incidental take statement may be appropriate to reflect that take. No take of the Huachuca springsnail, yellow-billed cuckoo, and headwater chub may occur between the listing and the adoption of the conference opinion through formal consultation, or the completion of a subsequent formal consultation.

If you have questions regarding this Biological and Conference Opinion or the SHA, please call Doug Duncan (520) 670-6150 (x236) or Sherry Barrett (520) 670-6150 (x223). Please refer to consultation number 22410-2003-F-0022 in future correspondence concerning this project.



for Steven L. Spangle

cc: Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ
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APPENDIX A: MAY AFFECT, NOT LIKELY TO ADVERSELY AFFECT

We determined that this action may affect, but is not likely to adversely affect the threatened loach minnow (*Tiaroga cobitis*) with designated critical habitat, threatened beautiful shiner (*Cyprinella formosus*) with designated critical habitat, threatened Yaqui catfish (*Ictalurus pricei*) with designated critical habitat, endangered Yaqui chub (*Gila purpurea*) with designated critical habitat, endangered Sonora chub (*Gila ditaenia*) with designated critical habitat, endangered jaguar (*Panthera onca*), and threatened spikedace (*Meda fulgida*) with designated critical habitat. Our rationales for the determinations follow.

LOACH MINNOW

The loach minnow was listed as a threatened species in 1986 (51 FR 39468). Critical habitat was designated on March 22, 2007 (72 FR 13356).

Within the action area, the loach minnow is generally rare to uncommon where it is found in limited reaches of the White River and the North and East forks of the White River; Three Forks area of the Black River; throughout the Blue River; Campbell Blue Creek; sporadically in Eagle Creek; fairly common in Aravaipa Creek; and in the San Francisco River between Clifton and New Mexico (Greenlee County)(Marsh et al. 1989, Velasco 1994, Bagley et al. 1995, 1996). Within the action area, critical habitat has been designated for all the San Francisco and Blue Rivers, Aravaipa Creek, and Eagle Creek - excluding the portions on the San Carlos Indian Reservation (72 FR 13356). Loach minnow populations continue to decline in many areas in Arizona. Loach minnow have been extirpated from the Verde River, those portions of the Gila River in Arizona, the San Pedro River, and presumably Tonto Creek.

Threats to these species and other background information are found in the listing and recovery plan (USFWS 1991, 51 FR 39468). Loach minnows are stream-dwelling fish, and do not do well in ponds. Most loach minnow sites are also on Federal lands. Because almost all loach minnow populations are in stream systems, it is highly unlikely that the permit species would be released there, since the SHA has restrictions on the use of sites that have the potential to connect to other waters.

Conclusion

After reviewing the status of the loach minnow, the environmental baseline for the action area, and the effects of the proposed action, we concur that the proposed action may affect, but is not likely to adversely affect the loach minnow, based on the following:

- The effects from changes in management of existing land-use practices, nonnative aquatic species control, and reestablishment of topminnow and pupfish on loach minnow will be insignificant and discountable to beneficial;

- Sites used by loach minnow have little potential as topminnow and pupfish habitat since loach minnow prefer streams and occur largely on Federal land; and

- Long-term benefits to loach minnow from the conservation activities through this SHA are possible.

YAQUI FISH

The Yaqui fish include the beautiful shiner, Yaqui catfish, and Yaqui chub. In 1984, the beautiful shiner was listed as a threatened species, and the Yaqui catfish and Yaqui chub were listed as endangered species. Critical habitat was designated for these three species at the time of their listing (49 FR 34490). A final recovery plan for the Rio Yaqui fish was signed in 1995 (USFWS 1995). Descriptions of these species are included in the Recovery Plan and listing document, and are included here by reference.

The distribution of the Yaqui fish in the action area is limited to the Rio Yaqui basin. The SBNWR currently contains all species. Yaqui chub are also on the Leslie Creek National Wildlife Refuge (LCNWR). Outside of the SBNWR and LCNWR, Yaqui chub occasionally disperse during high water to Astin Spring on the Malpai Ranch, but this is occupied ephemerally. Yaqui catfish, chub, and topminnow are in House Pond on the Slaughter Ranch which is under a conservation easement held by the SBNWR. In West Turkey Creek, Yaqui catfish and chub were released on the El Coronado Ranch.

All units of designated critical habitat for beautiful shiner, Yaqui catfish and Yaqui chub are included in the action area; but as they are all on Federal lands, no critical habitat for these species is within the covered area. Most Yaqui fish locations are also on Federal lands, though the El Coronado Ranch has its own habitat conservation plan for Yaqui catfish, Yaqui chub, and longfin dace. Because most Yaqui fish populations are on Federal lands or covered by a habitat conservation plan, the SHA does not apply. If these three Yaqui fish were proposed to be released into a site covered by the topminnow and pupfish SHA, additional compliance under the act would likely be necessary.

Conclusion

After reviewing the status of the Yaqui catfish, beautiful shiner, and Yaqui chub, the environmental baseline for the action area, and the effects of the proposed action, we concur that the proposed action may affect, but is not likely to adversely affect those three species, based on the following:

- The effects from changes in management of existing land-use practices, nonnative aquatic species control, and reestablishment of topminnow and pupfish on listed Yaqui fishes will be insignificant and discountable to beneficial;

- Current range of the three species would not overlap with the SHA; and

- Long-term benefits to the Yaqui species conservation activities through this SHA are possible by minimizing movement of nonindigenous species.

SONORA CHUB

The Sonora chub was listed in the U.S. and Mexico as threatened in 1986, with critical habitat (51 FR 16042). Reasons for listing included possible introduction of exotic fishes and their parasites into its habitat, and potential mining activities. The Sonora chub is particularly sensitive to these threats because of its very limited range, and because of the intermittent nature of the streams it occupies. A recovery plan was finalized in 1992 (USFWS 1992).

Most of the species range in Arizona is on Federal land, but there are some private inholdings in California Gulch and Sycamore Canyon that may have water during part of the year. Critical habitat is completely contained within the action area, but critical habitat is only on Federal land. Therefore, no critical habitat for the Sonora chub is within the covered area of the SHA. If the Sonora chub were proposed to be released into a site covered by the topminnow and pupfish SHA, or vice versa, additional compliance under the Act would likely be necessary.

Conclusion

After reviewing the status of the Sonora chub, the environmental baseline for the action area, and the effects of the proposed action, we concur that the proposed action may affect, but is not likely to adversely affect the Sonora chub, based on the following:

- Sonora chub have an extremely limited range in Arizona. The streams in which they occur are intermittent, but the population remains relatively intact and secure;

- Critical habitat for this species is only designated on Federal lands; therefore, there is no critical habitat within the covered area of the SHA;

- The effects from changes in management of existing land-use practices, nonnative aquatic species control, and reestablishment of topminnow and pupfish on the Sonora chub will be insignificant and discountable to beneficial; and

- Long-term benefits to Sonora chub conservation activities through this SHA are possible though reduced movement of nonindigenous species.

JAGUAR

The non-U.S. population was listed as endangered in 1972 (37 FR 6476). The geographic of the listing was expanded to include jaguars in the U.S. in 1997 (62 FR 39147). It is the largest native cat in the Western Hemisphere. It is found typically near water in warm tropical climates in savannah and forests. It is rarely found in extensive arid areas. Individuals in Arizona have been found in Sonoran desertscrub up through subalpine conifer forest. The loss and modification of habitat, shooting, and predator control have contributed to its decline

Jaguars have been sighted in the Baboquivari/Coyote Mountain complex, Pajarito/Atascosa/ Tumacacori Mountain complex, and the Peloncillo Mountains. The individuals are considered to be transients from Mexico. Many of the sightings occurred on higher elevations above the range of the covered species, and also on Federal lands. However, it is possible that jaguar periodically occur in the area covered by the SHA. Because almost all sites enrolled under the SHA will be small, it is extremely unlikely the sites will contain habitat that is suitable for the jaguar.

Conclusion

After reviewing the status of the jaguar, the environmental baseline for the action area, and the effects of the proposed action, we concur that the proposed action may affect, but is not likely to adversely affect the jaguar, based on the following:

- The effects from changes in management of existing land-use practices, nonnative aquatic species control, and reestablishment of topminnow and pupfish on the jaguar will be insignificant and discountable to beneficial;

- Most sites enrolled in the SHA are likely to be small, and have very small amounts of habitat that may be used by jaguars; and

- Most jaguar habitat and sightings are above the elevational range of the plan species, and are on Federal land.

SPIKEDACE

The spikedace was listed as a threatened species in 1986 (51 FR 23769). Critical habitat was designated on March 22, 2007 (72 FR 13356).

Within the action area, the spikedace is generally rare to uncommon where it is found in portions of Eagle Creek, the San Francisco River, and the upper Verde River (Marsh et al. 1989; Velasco 1994; Bagley et al. 1995, 1996). The distribution and numbers of the spikedace have been severely reduced by habitat destruction due to damming and channel alteration, riparian destruction, channel downcutting, water diversion, and groundwater pumping (51 FR 23769). These threats are common to many of the listed fish and are detailed above under the loach minnow and razorback sucker.

Spikedace are stream-dwelling fish, and do not do well in ponds. Most spikedace sites are also on Federal lands. Because almost all spikedace populations are in stream systems, it is highly unlikely that the permit species would be released there, since the SHA has restrictions on the use of sites that have the potential to connect to other waters.

Conclusion

After reviewing the status of the spikedace, the environmental baseline for the action area, and the effects of the proposed action, we concur that the proposed action may affect, but is not likely to adversely affect the spikedace, based on the following:

- The effects from changes in management of existing land-use practices, nonnative aquatic species control, and reestablishment of topminnow and pupfish on spikedace will be insignificant and discountable to beneficial;

- Sites used by spikedace have little potential as topminnow and pupfish habitat since spikedace prefer streams and occur largely on Federal land; and

- Long-term benefits to spikedace from the conservation activities through this SHA are possible through reduced use of nonindigenous species.

APPENDIX B: NO AFFECT

We have determined that this action will have no effect on the endangered Kearney bluestar, threatened Mexican spotted owl with critical habitat, endangered lesser long-nosed bat, endangered bonytail chub (*Gila elegans*), endangered brown pelican, threatened Cochise pincushion cactus, endangered Colorado pikeminnow, endangered ocelot, endangered woundfin with critical habitat, endangered Nichol Turk's head cactus, endangered Mexican gray wolf, candidate Acuna cactus, endangered Northern aplomado falcon, candidate Stephan's riffle beetle, endangered Pima pineapple cactus, endangered Sonoran pronghorn, threatened New Mexico ridge-nosed rattlesnake with critical habitat, endangered masked bobwhite, endangered Arizona hedgehog cactus, endangered Arizona cliffrose, candidate Lemmon fleabane, and endangered Mount Graham red squirrel. The rationales for our determinations are below.

KEARNEY BLUESTAR

- No SHA activities will occur within suitable habitat.
- No plants or their habitat will be impacted.

MEXICAN SPOTTED OWL

- There are no known Mexican spotted owl locations or PACs within the covered area, and no impacts to critical habitat are anticipated.
- The vast majority of Mexican spotted owl habitat is above the elevational range of the plan species.
- Mexican spotted owls most often use upland habitats.

LESSER LONG-NOSED BAT

- No roosts or potential roost sites will be impacted by SHA-related activities.
- Impacts to forage resources are not expected.
- It is highly unlikely that there would be ecological interactions between topminnow and pupfish and lesser long-nosed bats.

BONYTAIL CHUB

- No SHA activities will occur within suitable habitat.
- The species no longer occurs within the action area, and is not likely to in the foreseeable future.

BROWN PELICAN

- The species occurs in the action area rarely.
- The species is unlikely to use the habitats likely to be used in the SHA.

COCHISE PINCUSHION CACTUS

- No SHA activities will occur within suitable habitat.
- This is an upland terrestrial species, which does not occur in or near aquatic habitats.

COLORADO PIKEMINNOW

- No SHA activities will occur within suitable habitat.
- Any activities with Colorado pikeminnow may need separate compliance under the Act.
- The Verde River is designated as experimental, non-essential.

OCELOT

- There have been no confirmed ocelot sightings in decades in the action area.
- No known populations or individuals occur near the action area.

WOUNDFIN

- No SHA activities will occur within suitable habitat.
- Any activities with woundfin may need separate compliance under the Act.
- The Hassayampa River is designated as experimental non-essential.

NICHOL TURK'S HEAD CACTUS

- No SHA activities will occur within suitable cactus habitat.
- This is an upland terrestrial species, which does not occur in or near aquatic habitats.

MEXICAN GRAY WOLF

- Wolves are unlikely to occur at enrolled sites because wolves are limited to a specific area under the experimental non-essential rule.
- Wolves are unlikely to use many of the sites that would be enrolled under the SHA.

ACUNA CACTUS

- No SHA activities will occur within suitable cactus habitat.
- This is an upland terrestrial species, which does not occur in or near aquatic habitats.

NORTHERN APLOMADO FALCON

- Falcons are unlikely to occur at enrolled sites since they are limited to a specific area under the experimental non-essential rule, and will not be released in Arizona.
- This is an upland terrestrial species, which does not occur in or near aquatic habitats.

STEPHAN'S RIFFLE BEETLE

- Stephan's riffle beetle populations appear to be stable, with an extremely small distribution on Federal lands.
- The status of this species is dependent on limited aquatic resources within one canyon on Federal land.

PIMA PINEAPPLE CACTUS

- No SHA activities will occur within suitable cactus habitat.
- This is an upland terrestrial species, which does not occur in or near aquatic habitats.

SONORAN PRONGHORN

- Very few SHA activities will occur within suitable pronghorn habitat.
- Most pronghorn habitat is on Federal lands.
- This is an upland terrestrial species, which does not occur in or near aquatic habitats.

NEW MEXICO RIDGE-NOSED RATTLESNAKE

- Only known from Federal land within the covered area.
- SHA activities are very unlikely to occur within suitable habitat.
- Habitat for the New Mexico ridge-nosed rattlesnake is mostly higher than the elevational range for topminnow and pupfish.

MASKED BOBWHITE QUAIL

- Usually occurs only on Federal land within the covered area.
- SHA activities are very unlikely to occur within suitable habitat.
- This is an upland terrestrial species, which does not occur in or near aquatic habitats.

ARIZONA HEDGEHOG CACTUS

- No SHA activities will occur within suitable cactus habitat.
- This is an upland terrestrial species, which does not occur in or near aquatic habitats.

ARIZONA CLIFFROSE

- No SHA activities will occur in occupied habitat
- This is an upland terrestrial species, which does not occur in or near aquatic habitats.

LEMMON FLEABANE

- No SHA activities will occur within suitable habitat
- No plants or their habitat will be impacted.
- Habitat for the Lemmon fleabane is mostly higher than the elevational range for topminnow and pupfish.

MOUNT GRAHAM RED SQUIRREL (*Tamiasciurus hudsonicus grahamensis*)

- Only known from Federal Land.
- Habitat for the red squirrel is higher than the elevational range for topminnow and pupfish.

BIOLOGICAL OPINION SUMMARY - 22410-2003-F-0022
Arizona Game and Fish Department Safe Harbor SHA

Date of opinion: February 11, 2008
Project: Arizona Game and Fish Department Safe Harbor Agreement
Location: Gila River basin, Rio Yaqui basin, Rio Sonoyta basin, Rio Concepcion basin, Arizona
Listed species affected: Endangered Gila topminnow (*Poeciliopsis occidentalis*), endangered Yaqui topminnow (*P. sonoriensis*), endangered Quitobaquito pupfish (*Cyprinodon eremus*) with designated critical habitat, endangered desert pupfish (*C. macularius*), endangered Yuma clapper rail (*Rallus longirostris yumanensis*), threatened Chiricahua leopard frog (*Rana chiricahuensis*), endangered Canelo Hills ladies' tresses (*Spiranthes delitescens*), endangered Gila chub (*Gila intermedia*) with critical habitat, endangered razorback sucker (*Xyrauchen texanus*) with critical habitat, the candidate Huachuca springsnail (*Pyrgulopsis thompsoni*), endangered Huachuca water umbel (*Lilaeopsis schaffneriana* ssp. *recurva*) with critical habitat, endangered Sonora tiger salamander (*Ambystoma tigrinum stebbinsi*), the endangered southwestern willow flycatcher (*Empidonax traillii extimus*) with critical habitat, candidate yellow-billed cuckoo (*Coccyzus americanus*), and the candidate headwater chub (*Gila nigra*).
Biological opinion: No Jeopardy and no adverse modification
Incidental take statement:
Anticipated take: *Exceeding this level may require reinitiation of formal consultation.* Twelve actions were identified as potentially causing incidental take. Some actions could result in complete (100%) take of both topminnow and pupfish at enrolled sites. The other management actions are not expected to result in complete take of the species. Isolated individuals could be taken during these routine activities. Take due to two of the management actions are unlikely. Complete take would occur if the site was taken to baseline. All sites or populations established under the SHA may be taken when returned to baseline.
Reasonable and prudent measures and Terms and conditions: *Implementation of these measures through the terms and conditions is mandatory.*
1) Information obtained from pertinent monitoring operations will be reported and made available. Reports will include information from biological and compliance monitoring, incidental take, and all other actions undertaken to implement the SHA. Reports will be completed annually for the term of the permit; 2) Insure that the Yuma clapper rail, Chiricahua leopard frog, Gila chub, razorback sucker, Huachuca springsnail, southwestern willow flycatcher, headwater chub, yellow-billed cuckoo, and Sonora tiger salamander are adequately protected under the SHA, 2.1) Surveys for Yuma clapper rail, Chiricahua leopard frog, Gila chub, razorback sucker, Huachuca springsnail, southwestern willow flycatcher, headwater chub, yellow-billed cuckoo, and Sonora tiger salamander should be done when the baseline determination for topminnow and pupfish is done. If surveys are not completed then, surveys must be done before actions that could lead to take of those species. If additional ESA compliance covers impacts to these nine species, surveys may not need to be done.
Conservation recommendations: *Implementation of conservation recommendations is discretionary.*
1) The Service should explore the possibility of working with other landowners to implement similar recovery actions (Recovery Plan tasks 1, 2, 5, 6 and 2, 5, 7). Surveys must be conducted within potential habitat for the other species.